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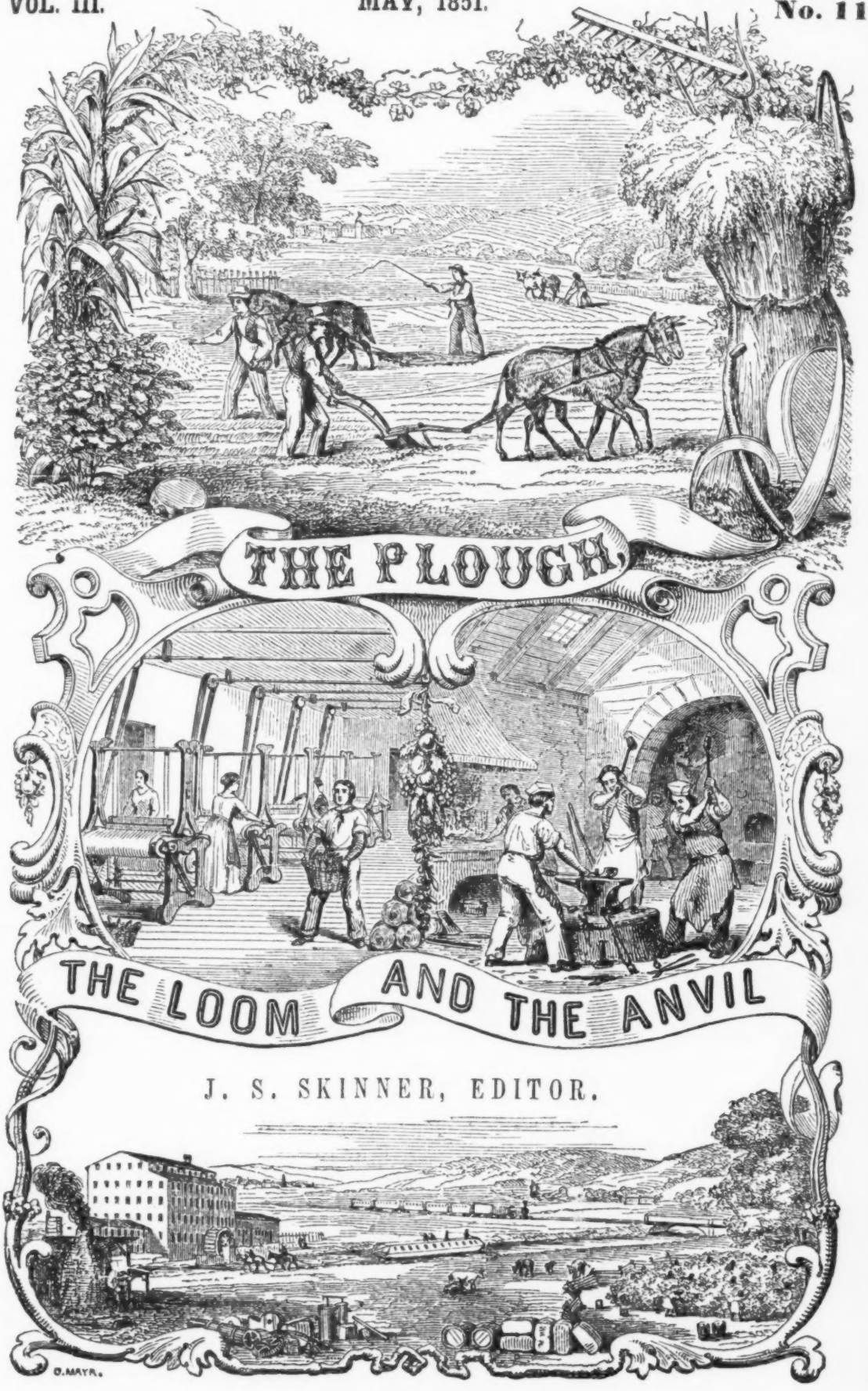

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The Plough, the Loom, and the Anvil.

VOL. III. MAY, 1851. No. XI.

THE PROSPECT:

AGRICULTURAL, MANUFACTURING, COMMERCIAL, AND FINANCIAL,

AT THE OPENING OF THE YEAR 1851.

BY HENRY C. CAREY.

IN now giving the closing chapter of Mr. Carey's review of the state of affairs at the opening of 1851, we desire to ask our readers, when they shall have finished its perusal, to determine for themselves if he has not fully established the proposition with which he set out, to wit:—"that, under that system which looks to war upon monopoly for the sake of perfect freedom of trade, the returns to both labour and capital increase." The facts he has furnished can scarcely, we think, leave upon their minds the slightest doubt of the perfect accuracy of the statement in his letter to the late Secretary of the Treasury, Mr. Walker, "that when we build the most furnaces we produce the most food—that when we build the most mills we produce the most cotton—that when we make the most cloth and iron we build the most ships—that when we most diminish our *necessity* for depending on distant markets we enjoy the most *power* to go to those markets—that when we look most to home we enjoy the most influence abroad."

We pray our agricultural friends to study the predictions of Mr. Walker, and to satisfy themselves that it is to the total failure of those predictions that they owe their present exemption from the ruin that has fallen on the coal and iron, the cotton and the woollen interests of the country. The policy of 1846 looked to the conversion of the whole people into farmers and planters, and rendering us more perfectly dependent on the monopolists of England. Its author predicted that we should by this time have more than a hundred millions of dollars of food for sale abroad. If we had, what should we do with it? Wheat sells in England for a dollar a bushel. Oats are not worth twenty-five cents. Barley is so cheap, that we are importing it—and yet it was to secure this great market of England that we closed mills and furnaces capable of turning out almost a hundred millions of dollars worth of cloth and iron, and prevented the building of mills and furnaces that would be now producing almost as much more!

CHAPTER VI.

PROMISES AND PERFORMANCES.

WE are assured that the present glut of iron, cloth, and almost all manufactured commodities, is the mere result of past "over production," and that, if we only persevere in maintaining the tariff of 1846, all will come right. The production of iron and cloth will diminish, and prices will then rise, when cloth and iron making will then again become profitable. It seems, however, to be forgotten that the consumers will then have to pay higher prices, and that it was for the purpose of increasing, and not diminishing the power to obtain both cloth and iron, that the tariff of 1846 was passed.

To enable us to judge of the value of these predictions as to future "prosperity," it may not be amiss now to review the promises made on the various occasions of alteration in our commercial policy, with a view to see whose pledges have, and whose have not, been redeemed—whose anticipations have been realized, and whose have been disappointed. That done for the past and the present, we may be enabled to judge for ourselves of the future, and determine what value may be attached to the promises that now are made.

The men who urged the passage of the protective tariff of 1828, said that it would increase the value of labour. It did so. The reward of labour in food and clothing so much increased, that immigration trebled, and Europeans found

it advantageous to bring their labour here for sale. They said it would increase the return to capital. It did so. At no time had there been a more regular demand for capital, and at none had the increase in the value of land been greater. They said it would facilitate the acquisition of cloth and iron. It did so. The consumption of iron, and of cotton and woollen cloth, doubled. They said that it would promote commerce. It did so. Internal commerce increased with great rapidity, and so did the external. Our shipping grew at a rapid rate. They said it would give an abundant revenue. It did so. The revenue so far exceeded the wants of the government that when silks and coffee and tea were freed from duty, there was still so large a revenue that we paid off the three per cents. at par. They said it would improve the national standing with the world. It did so. It made us so much credit abroad, that all the nations in Europe were anxious for our bonds when we abandoned the production of commodities, and turned our attention so exclusively to road-making. Every promise of the authors of that tariff was performed and every anticipation realized. The country had never before enjoyed so high a degree of quiet prosperity, and the increase therein was greater from year to year.

It was objected, however, that high tariffs gave too much revenue, and tended to increase the power of the government, while they tended to impose taxes upon the many for building up the fortunes of the few—that cloth and iron would be obtained more cheaply under lower tariffs, while the prices of cotton and wool, wheat and flour, and corn and pork, would be higher—that protection tended to diminish commerce with the world and to prevent the growth of shipping, and consequently that we could not, under such a system, occupy our proper position in the world of commerce. The objections prevailed, and the result was the passage of THE COMPROMISE ACT, the result of which was first to destroy the merchants and the shipping interest; next, to sink the price of cotton from thirteen cents to six, and that of tobacco from $90 to $50 per hhd., and thus destroy the planting interest; next, to sink the price of wheat, flour, corn, and pork to a point lower than had been known for probably twenty years, and thus destroy the farming interest; next, to annihilate the revenues of States, which were thus rendered bankrupt; next, to sink from $7 to $4.48 per head, the power to consume foreign merchandise, and thus annihilate the revenue of the general government; and lastly, so utterly to destroy the national credit with the world that not only could the government effect no loan, but that the very name of America was held to be synonymous with bad faith and repudiation.

The friends of the system of 1828 repeated in 1842 the pledges given in 1828. They said, give protection to the farmer and planter in their efforts to bring the spindle and the loom, the hammer and the anvil, to the side of the plough and the harrow, and all will yet be well. There will then be made a market on the land for all the products of the land, and the farmer and the planter will grow rich, enabling the states to collect their taxes and resume the payment of interest on their debts, and enabling the merchant to import largely, and thus to contribute largely towards the national revenue. Labour will be in demand and shipping will increase, and there will then again be prosperity throughout the land and among all the interests of the nation.

These pledges were redeemed under the act of 1842. From the depths of adversity the nation emerged with a rapidity that seemed almost miraculous. The consumption of cotton doubled, and that of iron trebled, while all other branches of manufacture kept pace therewith. The return to the labours of the farmer and planter were large, and exports were great, while imports grew more rapidly from year to year. Labour was in demand and immigra-

tion trebled. Ships carried good freights. Corporations and States resumed payment. Rail-roads and canals made good dividends. The national revenue increased in its ratio to population, from year to year, and the time was fast approaching when it would become necessary to abolish every interference with trade, except so far as was required for the direct purpose of protection, as had been found to be the case fourteen years before, when coffee and tea were freed from duty. The authors of the tariff of 1842 could ask and confidently ask—Has any pledge remained unredeemed? To this, the planter would have answered—"Cotton is still very low in price. Your tariff has not raised it." To this, the answer would have been—"You have been favoured with four seasons in which the average crop has exceeded by 500,000 bales that of the previous years, and we have done for you all the time allowed in extending the consumption from 270 to 550 thousand bales, but had you yourselves set your shoulders to the wheel—had you brought the loom to the cotton field—the domestic consumption might have been carried to 700,000 bales, and then you would not have had this cause of complaint. As it is, we have *sustained* the price of cotton, which, under these heavy crops, would have fallen thirty per cent. lower, but for the increase of domestic consumption." The farmer, too, would have replied, "Prices are still low." To this, the answer would have been, "Your crops have been immense, and we have provided for you a market among the producers of iron, and cloth, and coal, and among other manufacturers, and among the vast body of immigrants, for at least a hundred millions a year. It requires time to restore the proportion between the producers and the consumers, disturbed by the long years of the compromise act. Without the market we have provided, where would you have been? We have *sustained and advanced* your prices, which, without our aid, must have fallen almost one-half."

Thus far, the advantage would certainly appear to have been on the side of the advocates of protection. They had given no pledge that had not been redeemed, while their opponents had given no one that had not been forfeited. We may now look to the anticipations entertained, and the pledges given, by the advocates of the existing system.

The following is from the Report of Dec., 1845, which preceded the passage of the act of July, 1846, establishing that system:

"If cotton is depressed in price by the tariff, the consequence must be a comparative diminution of the product, and the raising in its place, to a great extent, hemp, wheat, corn, stock, and provisions, which otherwise would be supplied by the teeming products of the West. The growing West in a series of years must be the greatest sufferers by the tariff, in depriving them of the foreign market and that of the cotton-growing States. We demand, in fact, for our agricultural products, specie from nearly all the world, by heavy taxes upon all their manufactures; and their purchases from us must therefore be limited, as well as their sales to us enhanced in price. Such a demand for specie, which we know in advance cannot be complied with, is nearly equivalent to a decree excluding most of our agricultural products from the foreign markets. Such is the rigour of our restrictions, that nothing short of a famine opens freely the ports of Europe for our breadstuffs. Agriculture is our chief employment; it is best adapted to our situation; and, if not depressed by the tariff, would be the most profitable. We can raise a larger surplus of agricultural products, and a greater variety, than almost any other nation, and at cheaper rates. Remove, then, from agriculture all our restrictions, and by its own unfettered power it will break down all foreign restrictions, and, ours being removed, will feed the hungry and clothe the poor of our fellow-men throughout all the densely peopled nations of the world. But now we will take nothing in exchange for these products but specie, except at very high duties; and nothing but a famine breaks down all foreign restrictions, and opens for a time the ports of Europe to our breadstuffs. If, on a reduction of our duties, England repeals her corn laws, nearly all Europe must follow her example, or give to her manufacturers advantages which cannot be successfully encountered in most of the markets of the world."

The planter is here assured that the depression of the price of cotton is due to the tariff, and the pledge is given that upon the adoption of the new system, prices will so far rise that he will be enabled to go into its cultivation more extensively, obtaining more to sell, and at better prices. Unfortunately, however, he obtains less cotton, and to that alone is he indebted for better prices. In the two years of large crops (1847 and 1848), which followed the passage of the tariff of 1846, the average price was but about 6½ cents, and had the two succeeding ones been like them, giving almost an extra million of bales, the price would now stand lower than it ever yet has been. The four crops under the tariff of 1842 exceeded by more than two millions of bales (half a million per annum), the previous four, whereas the last four are not greater than their immediate predecessors by more than a hundred thousand bales per annum, while the domestic consumption, which in 1842 was but 260,000, had reached 600,000, thus diminishing by more than three hundred thousand bales the necessity for depending on European markets, and it is to this *diminution of dependence*, a consequence of protection during four years, and to *diminished production*, a consequence of the withdrawal of protection, that the present prices are due. It would be difficult, I think, to find in these facts any confirmation of the truth of the anticipations of the author of this passage. They are precisely those which produced the high prices of 1835 and 1836.

We are here told that agriculture, if freed from all restriction, will break down all "foreign restrictions," and we shall then feed the hungry and clothe the poor "of the densely peopled nations of the world." The measures proposed were adopted, and what progress have we made towards "feeding the hungry" of all those nations? The answer is found in the fact that our *exports* of food have diminished, while our *imports* have increased, and that there is now a prospect of a further diminution of the one and increase of the other, so that it may be doubted, if, in the current fiscal year, our *net* export of food will amount to even seventy-five per cent. of what it was at the moment this report was written. That, however, is not all. We were then prepared, to a large extent, to feed Europe in case of any extra demand, with rise of price, whereas we now are not prepared. Famine and potato-rot might now occur, and prices might rise to the point they reached in 1846–7, but they could draw from us no such supplies of food. Our exports diminish because the commodities for export are not produced, and prices are, therefore, higher than elsewhere in the world. Had we no tariff of protection for the farmer, we should import this year, of food, almost as large an amount as we exported last year, and as it is, the import will probably amount to several millions.

Again, we were told that a reduction of our duties must lead nearly all Europe to follow the example of ourselves and England, but as yet no step has been made in that direction. On the contrary, the effect of English action would seem to have been that of inducing the continental nations to cling more closely to protection, and the *Zoll-verein* raises its rates of duty, while France and Belgium promise no alteration in the direction of reduction.

In the same report, occurs the following passage:

"At least two-thirds of the taxes imposed by the present tariff are paid, not into the treasury, but to the protected classes. The revenue from imports last year exceeded twenty-seven millions of dollars. This, in itself, is a heavy tax; but the whole tax imposed upon the people by the present tariff is not less than eighty-one millions of dollars—of which twenty-seven millions are paid to the government upon the imports, and fifty-four millions to the protected classes, in enhanced prices of similar domestic articles.

"This estimate is based upon the position that the duty is added to the price of the

import, and also of its domestic rival. If the import is enhanced in price by the duty, so must the domestic rival; for, being like articles, their price must be the same in the same market."

So large an amount of taxes must, of course, have greatly enhanced the cost of the articles taxed, and to a corresponding extent diminished their consumption, to correct which, *and to facilitate the power of purchasing these heavily taxed commodities, the tariff of* 1846 *was passed.* What, however, has been the result? The consumption of iron, which had trebled under the tariff of 1842, has diminished one-fourth, notwithstanding an increase of population amounting to more than three millions, and notwithstanding a lapse of time in which it should and would almost have doubled. The year now closed, would have seen more than a million and a half of tons of iron applied to the production of machinery for increasing production and improving transportation, yet the quantity so applied has not reached 750,000 tons. The consumption of cotton, which doubled under the tariff of 1842, has diminished in actual amount under that of 1846, and so has that of wool, while the consumption of coal, which trebled under the tariff of 1842, notwithstanding a tax which was supposed to add $1.60 to its price, has remained stationary, notwithstanding its application since that date to ocean navigation and other purposes, for which it was then unused.

The pledge here given has not been redeemed, nor can it be, and for the reason that, as a rule, in our trade with Great Britain, she pays the duty, and must pay it, however high, or abandon the trade, as will be admitted by every man of business who will study the subject sufficiently to make himself fully master of it.

The farmer who *must* go to a distant market, *must* pay the cost of getting there, let that cost be what it may. Diminish his tolls—give him a turnpike —a bridge—or a railroad car—and at each step his expenses diminish, leaving him a larger price for his potatoes and his wheat. Destroy the bridge, or interrupt the communication by the road, and his prices diminish. Renew them, and they rise again. He, and he alone, must provide the means and take the risk of going to market.

So is it with a manufacturer. Give him a monopoly of axe-making, and all must come to him to buy axes, paying their own transportation. Abolish the monopoly and establish competition over the country, and he finds himself compelled to *send* his axes, paying his own expenses of freight and commission, and obtaining, of course, diminished prices. The man who *must* seek a market, must pay the cost of seeking it, and his immediate neighbours profit by the distant competition in the lower prices at which they themselves are supplied.

England has placed herself in the position of being compelled to *seek* a a market, by steadily pursuing the policy reprobated by Adam Smith. She *must* go to market with her wares, and she *must* overcome the difficulties that stand between her and the market, and the cost of overcoming those difficulties is shown in the diminished prices at which she sells the wares which it is her pleasure to manufacture for all the nations of the world. She *did* pay them under the tariff of 1828 and under that of 1842, and she is now much relieved by having less to pay under that of 1846.

It is doubtful if any case can be found in which an increase in the tariff has been followed by any material advance in the price of the manufactured commodities subjected to the charge, *except where the foreigner had the control of the market,*and it is admitted that the change has invariably led to great reductions. Woollen cloths under the tariff of 1842 were much lower than under the low one of 1841–2—and all the difference, both of price and duty, was paid by the foreign manufacturer.

The price of iron is now very low in England, but it is far higher than it would be had the tariff of 1842 been maintained, and such is the case with her cottons and woollens, for go to market she must, and whatever the obstacles to be met on the way to market *she it is that must remove them*, precisely as is the case with the distant farmer. The tariff of 1846 was a boon to her, because it relieved her of the payment of taxes to a great amount, while at the same moment imposing upon our own farmers and our planters the necessity for paying an enormous amount of taxes in the form of transportation upon the food and the cotton for which before they had found a market at home. The total repeal of duties and the free admission of cloth and iron into our markets would relieve the British people from the payment of an immense amount of taxes to which they are now subjected, and the prices of iron and of cloth would both rise, because such a measure would stop every furnace and every mill in the Union, and Britain would then obtain a good price, subject to no taxation—whereas, the re-enactment of the tariff of 1842 would be followed by a fall in her prices of both cloth and iron, because of the necessity for paying the increased taxes. A total repeal, while relieving Britain from a large amount of taxes, would tax our own people to so great an amount that the consumption of iron would probably fall below even two hundred thousand tons; and that of cloth to a single hundred thousand bales—whereas the re-enactment of the tariff of 1842, would so far relieve them from taxes, that the consumption of iron would speedily reach a million and a half of tons, and that of cotton a million of bales.

It will, however, be said, that we pay in the market of England, exactly the same prices that are paid by her own people, and that therefore we *do* ourselves pay the duty. The farmer, compelled to depend upon a distant market for the sale of any portion of his products, can make no discrimination between the price at which he sells the small quantity he *must* send abroad and the large quantity he sells at home. He supplies his neighbours with corn at 12½ cents, because that is as much as it will yield him if sent to the distant market. Remove the obstruction that stands between him and market—give him a railroad—and the price to his neighbours rises, because of the increased facility of going to market with the small surplus. Whatever is saved out of transportation goes to the producer—the owner of the land—for the first thing that is to be paid by land is transportation, and that it must pay.

The manufacturer, forced to depend upon a distant market for the sale of however small a quantity of his goods, is in precisely the same situation. The price of the whole is fixed by the price at which he can sell the last portion, and thus it is that the raising of our duties forces the British manufacturer to depress prices to that point at which he can introduce here the quantity for which he *must* depend upon us for a market, and the same depression takes place in the price of all that is supplied to Germany, Ireland, India, or China. If, then, the planter desire to compel England to sell cloth cheaply, and thus increase the market for cotton, his true course is to have a high tariff here that will compel her to low prices there.

No material reduction of prices takes place in any thing, the monopoly of the production of which remains to England. It is only in those in which she is compelled to maintain competition, and the more vigorous the competition the greater is the reduction, as is shown by all the facts that have been exhibited. She *must* go abroad for a market. She *must* look to us for a market, and the more the difficulties interposed between her and this market, the greater must be the sacrifices made to reach it. Pay the duty, high or low, she must, or abandon the trade.

Precisely such is, and must continue to be the case, with our planters and farmers when they *must* go to a distant market, with however small a surplus. They must overcome the difficulties, and the larger the quantity to be sent, the greater are the difficulties, and the lower, consequently, are their prices. The tariff of 1846 increases their difficulties and diminishes those of England. It taxes them and frees Britain from a large amount of taxation.

Were we now to adopt the policy called by the name of "free trade" we should close all our mills and reduce our consumption to one hundred thousand bales per annum. We should thus have 500,000 more to sell, while the market for cloth would be reduced 400,000. What then would be the charge of England for converting the cotton into cloth? We now give five bales for one, but we should then give ten for one.

Were we, on the contrary, to adopt the system of *protection as the true and only road to perfect freedom of trade*, our consumption would speedily rise to a million of bales, and our own demand would rise with the rise of our own supply, giving us half a million less to send abroad for which to seek a market. That done, instead of giving five bales for one, the planter would give two to one.

The history of the world may fairly be challenged for the production of a body of freemen pursuing a course so impolitic as has been that of our cotton planters. It has tended everywhere to raise difficulties between themselves and the consumers of those products. Instead of bringing the spindle and the loom nearer to their cotton fields, and thus diminishing the friction between them and their customers, their whole policy is directed towards increasing the friction, *for all of which they have to pay.* After the next revulsion their crops will average three millions, and our consumption will probably be under 400,000, leaving 2,600,000 to go abroad. What then will be the friction, and how much it will leave them, they may calculate for themselves.

Were the additional cost of transportation all that the cotton planter had to pay, he might perhaps rest content, but such is far from being the case. The policy of England is, to compel all the cotton of the world to pass through a narrow strait, and the greater the obstacles in the way of its passage, the greater must be the pressure at the entrance, and the larger the price paid for permission to pass through, as is seen from the fact, that when we have large crops, and consequently large quantities to export, English profits are enormous, while the planter is almost ruined. Occasionally, we have small crops, and then her policy leads to the creation of obstacles to the passage of this small quantity we have to export, by an increased substitution of Surat cotton, and of flour made from Polish wheat, in place of cotton. This is now being done to a vast extent, as is seen in the fact that the total consumption of American cotton in the year now closed, has been under a million of bales, being but a trifle more than it was in 1837–8,* when the price was then, as now, about seven pence, and even if we deduct from the present consumption the *additional* yarn required by *the protected Zoll-verein*, the actual quantity consumed in all the countries dependent upon England for supplies is less now than it was then.

The object of the British monopoly system is to interpose between the consumer and the producer as many difficulties as possible, and the greater their number the larger will be the commission for removing them. By this course she impoverishes her customers, and diminishes their power of consumption, and increases her power over them.

She is now anxious to substitute flax for cotton, and thus interpose a new difficulty in the road to market of the planter, and the day is probably not

* The consumption of that year was 913,000 bales.

far distant when she will do it. What then will be the condition of the planter with all the machinery for raising cotton in his own hands, and all that for converting it in the hands of his enemies?

From the report of December 1847, I take the following passage:

"In my report of the 22d of July, 1846, it was shown that the annual value of our products exceeds three thousand millions of dollars. Our population doubles once in every 23 years, and our products quadruple in the same period—that being the time within which a sum, compounding itself quarter-yearly, at six per cent. interest, will be quadrupled—as is sustained here by the actual results. Of this three thousand millions of dollars, only about $150,000,000 was exported abroad, leaving $2,850,000,000 used at home; of which, at least $500,000,000 is annually interchanged between the several States of the Union. Under this system, the larger the area, and the greater the variety of climate, soil, and products, the more extensive is the commerce which must exist between the States, and the greater the value of the Union. We see then here, under the system of free trade among the States of the Union, an interchange of products of the annual value of at least $500,000,000 among our twenty-one millions of people; whilst our total exchanges, including imports and exports with all the world besides, (containing a population of a thousand millions,) was last year $305,194,260; being an increase since the new tariff, over the preceding year, of $70,014,647; yet the exchanges between our States, consisting of a population of twenty-one millions, being of the yearly value of $500,000,000 exchanged, makes such exchange of our country equal to $23.81 per individual, annually, of our own products, and reduces the exchange of our own and foreign products, (our imports and exports considered as $300,000,000 with all the rest of the world,) to the annual value of thirty cents to each individual; that is, one person of the Union receives and exchanges, annually, of our own products, as much as seventy-nine persons of other countries. Were this exchange with foreign countries extended to ninety cents each, *it would bring our imports and exports up to* $900,000,000 *per annum, and raise our annual revenue from duties to a sum exceeding* $90,000,000. An addition of thirty cents each to the consumption of our products exchanged from State to State by our own people, would furnish an increased market of the value only of $6,300,000; whereas, an increase of thirty cents each, by a system of liberal exchanges with the people of all the world, *would give us a market for an additional value of* $300,000,000 *per annum of our exports.* Such an addition cannot occur by refusing to receive in exchange the products of other nations, and demanding the $300,000,000 per annum in specie, which could never be supplied. But, by receiving foreign products at low duties in exchange for our exports, such an augmentation might take place. The only obstacles to such exchanges are the duties and the freights. But the freight from New Orleans to Boston differs but little from that between Liverpool and Boston; and the freight from many points in the interior is greater than from England to the United States. Thus the average freight from the Ohio river to Baltimore is greater than from the same place to Liverpool, yet the annual exchanges of products between the Ohio and Baltimore exceed by many millions that between Baltimore and Liverpool. The Canadas and adjacent provinces upon our borders, with a population less than two millions, exchange imports and exports with us less in amount than the State of Connecticut, with a population of 300,000; showing that, if these provinces were united with us by free trade, our annual exchanges with them would rise to $40,000,000. It is not the freight, then, that created the chief obstacle to the interchange of products between ourselves and foreign countries, but the duties. When we reflect, also, that the exchange of products depends chiefly upon diversity, which is greater between our own country and the rest of the world, than between the different States of the Union, under a system of reciprocal free trade with all the world, the augmentation arising from greater diversity of products would equal the diminution caused by freight. Thus the Southern States exchange no cotton with each other, nor the Western States flour, nor the manufacturing States like fabrics. Diversity of products is essential to exchanges; and *if England and America were united by absolute free trade, the reciprocal exchanges between them would soon far exceed the whole foreign commerce of both;* and with reciprocal free trade with all nations, our own country, with its pre-eminent advantages, *would measure its annual trade in imports and exports by thousands of millions of dollars.*

In my last annual report, and that which preceded it, it was proved that the home market was wholly inadequate for our vast agricultural products. We have long had, for grain and provisions, the undivided markets of our own people. But these are not sufficient; and in a single year we have, with abundance of food retained at home, supplied the world with an addition at once during the last year, as shown by

table AA, of $41,332,282 in value of breadstuffs and provisions, bringing the value exported that year up to $65,906,273. Our manufacturers could not have consumed this surplus, or their non-consuming machines, which are substituted in their workshops for the labour of man. If the energy of our own people can add $41,332,282 to the export and supply of our breadstuffs and provisions in a single year, what could they not add to such products if they enjoyed free of duty the markets of the world? By table BB, it appears that the augmentation of our domestic exports, exclusive of specie, last year, compared with the preceding, was $48,856,802, or upwards of 48 per cent.; and *at the same rate per cent. per annum of augmentation, would amount in* 1849, *per table CC, to* $329,959,993, or much greater than the domestic export from State to State. The future per centage of increase may not be so great; but our capacity for such increased production is proved to exist, and that we could furnish these exports far above the domestic demand, if they could be exchanged free of duty in the ports of all nations.

This estimate of increased *production* here given was based upon the wonderful progress made in the previous four years, during which, progress had been great beyond all previous precedent. To enable us to realise it, we have closed our mills, and mines, and furnaces, and compelled almost our whole population to resort to the production of food, or to remain idle. In accordance with it, our power to produce agricultural commodities suited for trade with foreign countries, should now have grown at least thirty per cent., and our present surplus for exportation should be almost double what it was in 1846. How stand the facts? We have less cotton, less tobacco, less rice, less wheat, less corn, less pork, less cheese, and less butter to sell than we had then, and we raise less wool and less hemp for consumption. Production diminishes, and it must continue to diminish until it shall come to be recognised that men labour most advantageously when they work most in combination with each other, as they did under the tariff of 1842—and least advantageously when they work least in combination with each other, as they do under the tariff of 1846.

The view here presented in reference to the power of extension of the domestic and foreign trade, is so singularly in opposition to those forced upon us by our daily observation, that it is commended to the careful attention of the reader. The extension of the one to the amount of $600,000,000 is regarded as being almost possible, while a similar extension of the other to an amount of $6,300,000, would seem to be presented as being what was possible. In all this calculation one essential element is omitted, and that it should have been omitted by a man of business is almost wonderful. It is this. To effect an increase of exchanges, there must be an increase of production of things to be exchanged. To effect an increase profitably to both parties, there must be an increase in the production of the things to be *received* in exchange, as well in those to be *given* in exchange. If the planter increases the supply of cotton faster than the manufacturer increases the supply of cloth, there will be "a glut" of the one and a deficiency of the other, and the quantity of cotton to be given for cloth will steadily increase, whereas, if the supply of cloth tends to increase faster than that of cotton, the quantity of cotton to be given for cloth will as steadily diminish. Every individual man knows this to be true as regards himself. The more numerous the grist mills, the smaller are the tolls for converting the grain into flour. Diminish the mills and tolls will rise. Diminish the supply of grain and tolls will fall.

All this is as true with regard to nations, as it is with regard to individuals. If the products of one nation increase, and those of others, with whom it finds itself *compelled* to maintain trade, do not increase, it must steadily give more for less, and from this there is no escape but in emancipating itself from the slavery of being compelled to depend upon that nation for supplies.

Our power of increase is here stated to be equal to a duplication of *production* every twelve years, which should give a duplication of our *surplus* every six years, giving in 1852 of

Provisions, say	$137,000,000
Cotton, ...	bales, 3,500,000
Tobacco, ...	hhds. 300,000

Where now are we to look for an augmentation of the production of things to be received in exchange for all these good things? Certainly not to China, for her progress is slow, and she has no anxiety for foreign trade. Not to India, for her power of production diminishes from year to year, and must continue so to do. South America produces for our use little but sugar. Canada has food to sell, and does not need to buy. Portugal, and Spain, and Italy, and Greece, manifest no tendency towards augmentation of their products, nor does France give reason to expect that she will make a large increase. Germany exports food, and raises much of her own tobacco, and her increase of commodities with which to pay for either tobacco or cotton must be slow while so large a portion of her population is compelled to spend the best portion of life in the unprofitable business of carrying muskets. Russia is the great exporter of food. Looking throughout the world, then, the British isles excepted, there is no evidence of any tendency to increase in the quantity of commodities to be *given* in exchange for commodities they would desire to *receive*, and therefore the only effect that would result from an attempt to increase our dependance upon them for supplies, would be that we must steadily give *more* food, cotton, or tobacco, for *less* of something else that we needed—an unprofitable commerce to either individuals or nations.

There remains now for examination, the United Kingdom of Great Britain and Ireland. Has her power of production increased, or is it likely to increase so as to enable her to give us value for this immense mass of products of which she is to be made the great consumer or distributer? To judge of the future, we must look to the past. If it has increased, it will continue to increase at an accelerated pace. If it has decreased, each year will see an acceleration of the rate of decrease.

In the first four years of this century, the domestic exports of that country averaged *thirty-nine millions* of pounds sterling. In this were included, of foreign cotton, silk, wool, dye-stuffs, and other materials of manufacture, *and foreign grain*, an amount of scarcely more than seven millions sterling, leaving, as the net export of *British labour and its products*, about thirty-two millions sterling, applicable to the purchase of tea, coffee, cotton, silks, and other commodities for domestic use. The population was about fifteen millions, and the amount per head was therefore above £2, or more than $10.

In the years from 1815 to 1819, the annual average of exports was *forty-four millions of pounds*, of which not less than twelve millions were needed for the foreign raw materials required for their production, and for the foreign grain consumed by her manufacturing and mining population. The balance, thirty-two millions, was now to be divided among a population of twenty-one millions, giving to each about £1 10*s*., or $7.20, for the purchase of foreign commodities for consumption.

From 1827 to 1834, the exports averaged *thirty-eight millions* of pounds, and the quantity of foreign raw materials and foreign grain required for their production was not less than fourteen millions, leaving twenty-four millions as the export of the labour and products of twenty-three millions of people, and giving to each 21*s*., or $5, for the purchase of foreign commodities for consumption.

In 1849, the exports amounted to about *sixty millions*, in the preparation of which had been required of foreign raw materials, foreign grain, and other articles of food with which Great Britain supplied herself entirely in all the former periods, considerably more than forty millions of pounds, leaving certainly not more, and probably much less, than twenty millions, as the actual export of British labour and its products, and giving to each person about 12*s.*, or $2.88, to be applied to the purchase of tea, coffee, sugar, cotton, silks, and other commodities, the same precisely to which, in the earlier years of the country, the amount to be applied exceeded £2, or $10.

To the sums here given are of course to be added the earnings of British shipping, which have varied in nearly the same order as the exports of British labour. In the first period they were very large. In the second, they were considerably less. In the present one, notwithstanding the vastly increased quantity of shipping, it may be doubted if the actual amount earned is as great as in the first, and as that amount had to be divided among a double population, it follows that the sum for each, resulting from the profits of navigation, is about half as much in the last period as the first.

There are also to be added commissions, and charges of every description, which increase in amount as "gluts" become more frequent, and "stock on hand" increases. The amount of taxation upon the farmers and planters of the world, to be found under this head, is probably four times as great as it was in the first period, and makes large amends for deficient production of things to be exchanged.

It is supposed that, "if England and America were united by absolute free trade, the reciprocal exchanges between them would soon far exceed the whole commerce of both;" but we here see that the productive power of England has diminished from year to year, while "free trade," even so far as it has existed, has enabled her to fix the prices of all of our staples *that she desired to buy*, and all of her staples *that she desired to sell*, leaving to us no option as to how we would buy or how we would sell. The more we sent her, the less she gave us for it; for the larger was the stock on the land, and the larger were the deductions. In the period from 1815 to 1819, one hundred millions of pounds of cotton sent from the plantations would have brought back more iron than six hundred millions in 1845–6, and yet the manufacture of iron had been improved in the intermediate period far more than the culture of cotton.

Absolute free trade between the two nations would close every mill and furnace in the Union, without an exception, and thereafter England would still more effectually dictate the laws of purchase and sale. Thereafter the cotton planter would be allowed two cents per pound, and the price of iron would be £10. It is really singular that the advocates of what is called "free trade" do not see that what England is contending for is the power to compel all the raw produce of the world to be sent there, that she may fix the price at which she will buy, and also fix the price at which she will sell. Protection is an act of resistance to this exercise of power, and tends to enable the farmers and planters of the world to trade on equal terms with the world for their cloth and iron, and therefore it is that trade grows in amount under it, while it withers with every approach to what in the Manchester system of political economy is called "free trade."

The British policy has been gradually exhausting the nation and diminishing its productive power, and therefore it is that it is driven to the effort to *compel* all the world to come there with their products, *to have the prices fixed in accordance with the ability of her people to pay for what they need.* That ability has diminished rapidly, and therefore it has been that the planters have been compelled to give more and more cotton, sugar, and tobacco,

for less and less cloth and iron, while the amount of freight, commissions, brokerage, and storage, to be paid on the steadily increasing quantity of raw products, has been constantly increasing, until throughout the world they have been almost ruined.

The radical errors in all these reports are two. The first is, that of the idea of the existence of any thing like *territorial* division of labour, except that which results from difference of climate. Wheat requires a northern climate, and cotton and sugar seek a southern one; but the man who grows the wheat is capable of converting it into flour; and it would not be more absurd to send the wheat to a distance to be ground, or the trees to be sawed, than it is to send the cotton to be spun, or the sugar to be refined. Under a natural system of real free trade, each country would exchange its products with each other in the most perfect form, so as to save transportation. Under the British system, each is *compelled* to exchange in the most imperfect form so as to increase transportation; and as all that cost *must* be paid by the land, we may now see why it is that the farmers grow rich and increase their products under protection, which tends to diminish transportation, and become poor under the British system, mis-called free trade, which tends to increase it. How far these views correspond with those of the great apostle of free trade, may be seen on a perusal of the following paragraph from the *Wealth of Nations*:—

"An inland country, naturally fertile and easily cultivated, produces a great surplus of provisions beyond what is necessary for maintaining the cultivators; and on account of the expense of land carriage, and inconveniency of river navigation, it may frequently be difficult to send this surplus abroad. Abundance, therefore, renders provisions cheap, and encourages a great number of workmen to settle in the neighbourhood, who find that their industry can there procure them more of the necessaries and conveniences of life than in other places. They work up the materials of manufacture which the land produces, and exchange their finished work, or, what is the same thing, the price of it, for more materials and provisions. They give a new value to the surplus part of the rude produce, by saving the expense of carrying it to the water-side, or to some distant market; and they furnish the cultivators with something in exchange for it, that is either useful or agreeable to them, upon easier terms than they could have obtained it before. The cultivators get a better price for their surplus produce, and can purchase cheaper other conveniences which they have occasion for. They are thus both encouraged and enabled to increase this surplus produce by a further improvement and better cultivation of the land; and as the fertility of the land has given birth to the manufacture, so the progress of the manufacture re-acts upon the land and increases still further its fertility. The manufacturers first supply the neighbourhood, and afterwards, as their work improves and refines, more distant markets. For though neither the rude produce, nor even the coarse manufacture, could, without the greatest difficulty, support the expense of a considerable land carriage, *the refined and improved manufacture easily may*. In a small bulk it frequently contains the price of a great quantity of the raw produce. A piece of fine cloth for example, which weighs only eighty pounds, contains in it the price, not only of eighty pounds of wool, but sometimes of several thousand weight of corn, the maintenance of the different working people, and of their immediate employers. The corn, which could with difficulty have been carried abroad in its own shape, is in this manner virtually exported in that of the complete manufacture, and may easily be sent to the remotest corners of the world. In this manner have grown up naturally, and, as it were, of their own accord, the manufactures of Leeds, Halifax, Sheffield, Birmingham and Wolverhampton. Such manufactures are the offspring of agriculture."

"In a small bulk it frequently contains a great amount of raw produce." This is in accordance with common sense. A thousand pounds worth of cutlery contains food, fuel, and iron ore, that could not in their natural condition have travelled five hundred miles, and yet in their new form they may be sent to the most remote parts of the earth; and therefore it is that the power to trade grows under the system that looks to compressing the raw

materials into the smallest compass, so as to fit them to travel to distant lands. Adam Smith was a true philosopher. His successors of the English School have inherited from him nothing but the power to use his name, and abuse the influence which it has given them.

The second of these errors is, that it is advantageous to place ourselves in a position to be compelled to exchange labour for labour with men whose labour is cheap. No man does this in private life. If *compelled* to exchange with the common labourer, the learned Advocate would find it difficult to obtain even day's labour for day's labour. If free to select those with whom he exchanges, he gives the labour of an hour for that of a week or a month. So is it with nations. If they place themselves in a position to be *compelled* to exchange with poorer nations, they must often give much labour for little labour, as is the case at this moment in our trade with Britain, in which we give *at the least* the labour of five days for the labour of one, and the longer we shall permit her monopoly to exist, the more shall we give and the less shall we receive, for the productiveness of her labour diminishes from day to day as men become *cheaper*, and the desire more exists for expelling them from the land to seek a refuge in the lanes and alleys of Glasgow, Liverpool, and Manchester.

Both of these errors had their origin among the Manchester School of Political Economists, and they are now transplanted to this country, every fact of whose history is in direct opposition to them. Being false, it is not matter of surprise that the system of policy founded on them should prove destructive of the powers of the nation. The policy of 1842 looked to the establishment of competition between men of equal and constantly-increasing powers. That of 1846 seeks to produce a necessity for competition with men of inferior and constantly-diminishing powers. The one tends to elevate man in the scale of civilization. The other to sink him into barbarism.

With the report of 1847, there was furnished a statement showing the growth of tonnage that might be anticipated under the new system. It was as follows :—

June, 1848	3,145,993	June, 1853	5,257,254
" 1849	3,486,075	" 1854	5,825,563
" 1850	3,863,920	" 1855	6,455,306
" 1851	4,281,550	" 1856	7,153,124
" 1852	4,744,386	" 1857	7,926,377

How far this anticipation has been realized, will be seen on an examination of the following statement of the actual growth of the navigation of the Union :—

1847–8	3,154,041
1848–9	3,334,015
1849–50	3,535,054

In 1849, the growth should have been 344,000 tons, and it was 180,000. Last year it should have been 377,000, and it was 201,000.

At the time of the publication of the report of 1847, the gold mines of California had not been discovered. They have since furnished employment to probably 400,000 of tons, and to that employment alone it has been due that any additional shipping has been needed. If we deduct from the total quantity now existing that which exists by virtue of this chance discovery of employment, we shall find that instead of the promised increase of 700,000 tons, there has been none whatever to set off against an increase of at least 600,000 tons under the tariff of 1842; and if we inquire into the prospects of ship owners, we shall find that they have rarely been worse

than at present, whereas in 1846 they were better than they had almost ever been.

The pledge of increase in shipping has not been redeemed, and for the single reason that it was based upon an error, as to the means by which shipping might be increased. The nation that sends to market raw products to exchange for finished ones, must pay the whole cost of transportation, because it sends to market five cargoes for one that it receives, whereas the nation that finishes its products and sends them to market in the form in which they can be consumed by the producers of other raw products, wool, sugar, coffee, tea, or other bulky articles, pays little freight. The difficulty under which we labour is that our exports are bulky and our imports compact. Protection tends to lessen this difference, because it tends to enable us to finish our products, and because it gives us a return freight in the form of immigrants. Under the tariff of 1842, immigration trebled, whereas under that of 1846 it has become stationary, with a tendency to decline, and thus homeward freights diminish as production diminishes, and small exports of food, cotton, and tobacco, are accompanied with diminished import of the more valuable commodity, *man*, of which, with adequate protection to labour, we could import a million annually.

The year 1847–8 did not realize any of the anticipations that had been made in 1847. Our export of food diminished, and specie was exported to take its place. Nevertheless, in the report of 1848, we were assured that the export of food "must go on augmenting," and that "all this specie must soon come back to our country, except so far as it is lost by foreign bankruptcy."

This report, like its predecessor, is filled with anticipations of the wonderful effects that must result from the adoption of the new system, but it is not necessary to trouble the reader with more than the two above referred to, in regard to the first, of which we know that the export of food has already fallen almost one-third, with promise of a fall in the present year upon which we are now entering, greater than in any which has preceded it; and in regard to the second, of which we know that we have not only continued to export specie from that day to the present, but that we have also exported at least eighty millions of certificates of debt, on which we have to pay interest, and the principal of which we shall be called upon to pay at a time when it will be sure to be very inconvenient.

Throughout these reports it is everywhere insisted upon that our surpluses of food are so great, and must continue so rapidly to increase, that it would be absurd to think of making a market for them at home. We, however, have now evidence that the surpluses may be largely diminished by the very simple process of producing a state of things that causes large emigration to the West, there to create new farms and plantations, and large demands for roads, the farms and roads being made by the men who would otherwise have been occupied in producing food or cotton, coal, iron, or cloth. The difference between the two systems, those of 1842 and 1846, is this. The first tended to render existing machinery, whether farms, mills or furnaces, largely productive, to increase production, to increase the facility of obtaining food and clothing, and ultimately to make a market on the land for all the vastly increased quantity of the products of the land. The second tends to render existing machinery unproductive, as it has already done to the extent of hundreds of millions of dollars—to drive labour and capital to the production of new and less productive machinery—to diminish production,—to diminish the facility of obtaining food and clothing—and ultimately to destroy the market on the land for even the diminished amount of the products of the land. The first fostered the great home trade, the

only possible foundation upon which a large foreign trade can ever be built. The second annihilates the home trade, in the hope to build up a foreign one, and with each step in its progress, we have less to sell, and consequently less power to buy. Adam Smith taught all this, and it is the basis of his whole system, but his successors in his own School have repudiated him.

Such were the promises of the men of 1846. Not a single one has been redeemed. Let them be compared with the promises of 1842, and let it then be shown what was the promise then made that was not realized.

It will be said, however, that it promised revenue, and that that promise has been performed, but the time has not yet arrived for testing the performance of that pledge. The compromise gave surplus revenue in its first four years, and so has done the tariff of 1846. The compromise gave almost no revenue, as its second four years approached its close, *and such will be the case with the second term of the tariff of* 1846. Both of these free-traders have traded upon the credit built up by their predecessors. The first broke down after having exhausted that credit, *and the second will do so.* The time for testing this pledge will be about 1852–3 or 1853–4, after the next convulsion, when, as in 1841, we shall have much to sell and no market to sell in, and much to buy, and neither money nor credit with which to buy.

It would seem to be incumbent upon the advocates of the existing system to explain why it is that their promises have not been redeemed—why it is that as we produce less iron we have less power to supply food—why it is that as cotton mills are closed the production of cotton, sugar, rice, tobacco, and hemp, all Southern products, diminishes with such rapidity. Under the tariff of 1842, we increased the proportion of our population engaged in mining and smelting ore, mining coal, and making cloth, and largely increased the population engaged in the construction of machinery, the opening of mines, the building of mills and furnaces, and yet the productiveness of agricultural labour increased more rapidly with every step towards making a market on the land for the products of the land. Under that of 1846 we have immensely increased the proportion of our agricultural population, and yet the productiveness of agricultural labour diminishes as we close the domestic market for its products.

The friends of the present system denounce the idea of protection as "obsolete." It is one of the "exploded fallacies," and they deem unworthy of attention any argument in its favour. To all such I would beg to recommend a perusal of the following short extract from a recent work of much merit:—

> "To know while any thing is taking place, what *must* follow—in other words to know the necessary consequence of what is going on at the present moment—that is science. To know when any thing has occurred, what *must* have preceded, in other words, to know the necessary antecedents of what has occcurred—that is science."*

The advocates of the tariff of 1828, and the advocates of that of 1842, predicted increase of production, increase of commerce, and increase of national wealth, credit, and power, as the results of their measures, and their predictions were realized.

The advocates of the measures of 1833, predicted *greater* increase of production, *greater* increase of commerce, and *greater* increase of national wealth, credit, and power, and the result was a vast diminution of production and commerce, and national impoverishment, followed by national weakness and discredit.

The advocates of the measures of 1846 made the same promises. Thus far the results have been the same, and they are to be the same.

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* Introduction to the Study of the Social Sciences.

If, now, science consists in knowing when any thing is taking place what *must* follow, it would seem that the real scientific knowledge was on the side of the advocates of the system of 1828 and 1842, for they did know what *must* follow, and did predict what would follow, and their predictions were more than realized. It is time that the advocates of what are called "free-trade" measures should lay aside their assumption of superior knowledge, and study the political economy of Adam Smith.

We are now entering upon the second term of the present system of policy, and the reader has had before him the pledges given in reference to both it and its predecessor. The one having proved a failure, we have reason to suppose that the other may do so likewise. That it will do so, and that the only difference will be that the failure will be more complete, I propose now to show, putting on record my predictions of the next four years, that others may have an opportunity at the close of the term to review my anticipations as I have reviewed theirs, and to expose my errors as I now exhibit theirs.

At the last session of Congress, an act was passed granting bounties in land to all persons who had served in the various wars in which the country had been engaged, from the Revolution to the present time. The quantity that will be required to meet the demands under this law is estimated at about ninety millions of acres, all of which may be regarded as a bounty on emigration from the old states to the new states and territories, at a time when, even without such bounty, the tendency to emigration was as great, and probably greater than ever had been witnessed, owing to the universally diminished demand for labour in all the Atlantic states.

Each and every man that emigrates, ceases at once to be a producer of any thing that can be eaten, worn, or used, while he continues to eat, drink and wear things that are produced by others. Each man that emigrates takes with him some amount of capital that has heretofore been employed in the production of things to be eaten, worn, or used, but from the time of its withdrawal it ceases to produce any thing, its owner applying it to the purchase of commodities required for the use of himself and his family while engaged in the preparation of the new machine that is to take the place of the one he has heretofore used, whether mill, furnace, mine, or farm.

With each and every person that emigrates there is increased difficulty in finding employment by those who are left behind. The closing of the mines compels the miners to emigrate, and thus diminishes the market of the neighbouring farmer for those bulky products of the earth which pay him best, but will not bear transportation to distant markets. It also closes up the demand for the spare labour of himself, his sons, his horses and wagons, and his timber, and thus compels the separation of the members of the family from each other, diminishing the power to clear and cultivate his farm, and ultimately to divide it into smaller portions, each one of which could, and would be made to produce more than is now produced by the whole.

Whatever, then, may be the ultimate result of an increase of emigration, the immediate effect is, necessarily, a diminished amount of production by *both labour and capital*, and that diminution cannot be estimated at less than five hundred dollars per head for each man, married or single, and it would be safe to place it higher. The emigration of the past year has been very large, but having now offered a bounty upon its increase, we may safely estimate that that of the present and future year will be much larger, and if we take *the addition* at only twenty thousand per annum, the diminished production of commodities in consequence of this law, in this and the next year, will be twenty millions of dollars.

It is now proposed to grant to every head of a family in the Union a quarter

section of land, as a further bounty on emigration, and as "madness rules the hour," it is probable that such a law will pass, the consequence of which will be a vast further increase of emigration, and, consequently an enormous diminution in the value of all landed property in the already settled states, from the Mississippi to the Atlantic.

The perfect form of society is that in which the centrifugal and centripetal forces balance each other perfectly, and whenever either of these forces obtain the mastery, the inevitable effect is impoverishment, weakness, and ruin. The policy of England has been to increase the centripetal force within herself, and the consequence has been to increase the centrifugal one in all connected with her, impoverishing and destroying both herself and them. Ireland is likely to become almost depopulated. Much of Scotland* is already so, and the great object of desire in England is now the expulsion of population.

The policy of 1846 is centrifugal in its tendency. It looks to sending from the land all the products of the land, which is thereby exhausted. It looks to depriving the owner of the land of his market for its most profitable products, the potatoes, the turnips, the hay and straw, the veal and milk, and other commodities that will not bear transportation. It looks to confining him to the single pursuit of agriculture, and thus depriving him of a market for all the labour of himself and his family, his horses and his wagons, not needed on his farm. It looks to compelling the owner to emigrate after having exhausted his land. It looks to continuing the occupation of the land in large and unprofitable farms, instead of dividing it into small and profitable ones.

Including California, it has probably already compelled the transfer of not less than half a million of men from the older states to the newer ones—from places at which they were engaged in producing commodities that could be used in satisfaction of their necessities, food, fuel, cloth, and iron, to other places in which they are engaged in the creation of new machinery, requiring all the time to be fed, and clothed, and lodged, and that, too, at a cost that is terrific. The California emigrant eats the food of Chili, and sleeps in a house built of the lumber produced in New York or Maine, or perhaps Wisconsin. The emigrant to *Santa Fe* eats pork that costs for its transportation no less than *thirty-two dollars* per barrel, and he who goes to *Paso del Norte* eats that which has cost for its simple transportation no less than *forty-eight dollars*,† while his flour costs him about forty dollars. The half million of men thus scattered over the earth, aided by the capital that has been employed in placing them where they are, and maintaining them, were capable of producing food, cloth, iron, fuel and other commodities, to the extent of at least five hundred dollars each, making an aggregate of not less than two hundred and fifty millions of dollars in a single year; whereas, all the return as yet received from them will not pay for one half of the commodities furnished for their support by others, so that the whole of this vast sum constitutes a

* "It is becoming clear that nothing can relieve the poverty of the Highlands but the property of the Highlands. The people must be fed, in spite of mortgaged estates and laws of entail, and all other burdens whatsoever. The land must be free, that the people who till it may live. The Highlands require an Encumbered Estates Commission to cut the Gordian knot. Five years of famine in the Highlands have failed to clear off the wretched population. It now remains to be seen whether the land cannot be made to afford them some support."

† These are the government contract prices. How enormous is the cost of transporting and sustaining men in the remote districts to which they are now being driven, may be judged of by the following comparative view of the charges from the Quarter Master's Department in the four new departments of Oregon, California, New Mexico, and Texas, as compared with the rest of the Union:

New departments, $4,225,752. Old departments, $530,247.

deduction from the present power of the nation to produce commodities in which to trade, or with which to pay for those that we desire to purchase from other nations, and hence it is that we have now so little to export, and are running so heavily in debt.

Emigration produces a necessity for roads. The blocking up of capital from all employment in the construction or carrying on of mills, furnaces, or mines, causes capital to accumulate and enables speculators to obtain means for making roads. Each successive day brings with it advices of the closing of a mill, a furnace or a mine, and therewith come also advices of the increased abundance of money, or unemployed capital, for which there now exists no outlet whatever, except in road-making. Road makers, however, produce nothing that can be eaten, drunken, or worn, and yet they must eat, drink, and wear, and those at whose command the roads are made must supply the food, the clothing, and the lodging which constitute the wages of the men by whom they are made.

The railroads now in progress of construction throughout the country amount to many thousands of miles—probably six or eight thousand.* The tables of almost every legislative body in the Union, at the coming sessions, will be covered with applications for new ones, while charters for plank-road companies will be asked for by hundreds. Every state, city, and town, and almost every town and township, is now ready to use its influence or lend its credit for obtaining the means of feeding, clothing, and lodging the people who are needed to secure that which has become the one great and absorbing object—a good road to market—and bonds of every kind are forthcoming, to be used in the purchase of the necessary iron. The aid of Congress, too, is invoked, and it listens readily to the application. The last session witnessed the granting of a large bounty on the making of a road from Illinois to Mobile. The present one is likely to witness the passage of laws granting similar bounties for numerous other roads in the South and West, including a large one with which to commence the great road from the Missouri to the Pacific. Rivers and harbours are to be improved at a cost of some millions. The older states, too, are asking for a share in this new and grand distribution of lottery prizes. Pennsylvania has already claimed some millions of acres, and other States are following her example. If, now, we add all those things together, it can scarcely be doubted, that in their various forms they present an aggregate equivalent to not less than fifteen thousand miles of railroad, which, at an average cost of $18,000 per mile, would be equal to two hundred and seventy millions of dollars, every farthing of which must consist of labour diverted from the production of things that might be consumed at home, or exchanged for things abroad, and applied to the making of machines upon which things are to be carried, and which can neither be consumed at home nor exchanged abroad.

This, however, is not all. Congress is besieged with other applications. One desires the fitting out of the Pennsylvania, at a cost of several hundred thousand dollars, as a national contribution to the new British show-shop, the object of which is to induce the people of the world to come to England and spend their time and their money. Another claims an appropriation for a line of steamers to Antwerp or Havre. A third would have lines from Philadelphia or Baltimore to Liverpool. A fourth desires a few millions for a line to carry the emancipated slaves of America to the coast of Africa, and to bring the Irish slaves of Britain to America, and that too at a time when the inducements to immigration are rapidly disappearing. A fifth would have a line of steamers from San Francisco to China. Tehuantepec, and the Isth-

* Those of Ohio and Indiana alone amount to nearly two thousand.

mus, and the Nicaragua Canal come in for their respective shares of attention, and the claims of each and every of them are pressed upon the national attention as being indispensable to the extension of trade, when with each step in that direction, there is a diminution in the production of things in which to trade. The less cotton we raise, the greater is held to be the necessity for roads. The less food and tobacco we export, the greater is thought to be the need for ships. The less foreign merchandise we are able to pay for, the more, as it seems to be thought, is the duty of providing steamers by which to bring it.

Another set of speculators has Canada in charge. That country is poor and her lands are of little value, while those of the Union close to the line are valuable. The one has no market for her products, while the other has. Canada desires to raise the price of her land and labour to a level with those of the Union. She has friends within the Union who are willing to depress ours to a level with hers, by the passage of an act permitting the Canadians to sell their food and their wool within the Union and to buy their cloth and their iron out of it, thus granting them all the rights of citizens, while imposing upon them the performance of none of the duties of citizenship. The passage of this act will largely promote the transfer of labour and capital to Canada, and largely diminish the productive power of the Union, and in return for this sacrifice we are offered a new road to market, the St. Lawrence, the use of which its present possessors are now rapidly abandoning. Diminution of production and diminution of the value of land and labour are, however, held as nothing when compared with obtaining more roads by which to carry to market that diminished product. It is madness only to be paralleled by that of England in 1846, and

> "Each, where madness rules the hour,
> Would prove his own expressive power"—

by endeavouring to satisfy his hearers in and out of Congress, that it matters little the closing of furnaces and mines, or the abandonment of farms and plantations, provided only, that roads and steamers be provided in sufficient number.

If we now take the quantity of labour withdrawn from production at home to the creation of new farms, plantations, and states, in the West, and likely to be further withdrawn as the bounty land system comes further into operation—the quantity withdrawn and likely to be withdrawn for the creation of this immense system of roads—the number of persons now thrown absolutely idle in consequence of the closing of mines, furnaces and mills,—the diminished production among farmers consequent upon the withdrawal of a demand for the more bulky products of the farm—the diminution consequent upon the annihilation of the productive power of seventy, or eighty, if not a hundred millions of dollars invested in mills, mines, and furnaces,—and the further diminution consequent upon the transfer of capital and labour to Canada, Mexico, the Isthmus of Panama, and Nicaragua—it would seem impossible to doubt that there must be in the next and following years a diminution in the power to produce commodities for consumption or exchange, to the amount of a thousand millions of dollars, or five hundred millions of dollars per annum, being one-sixth of the total production, estimated by Mr. Walker three years since, and perhaps one-fourth of the true amount of production, which does not probably exceed two thousand millions of dollars.

How is this diminished production to become obvious? We already have little food to sell, and every transfer of labour from the production of food to the creation of new machinery, must lessen the quantity. If all these

works are to go on, the supply of food must be greatly diminished, and instead of exporting, as now, more than twenty millions of it, the probability is that we shall see the exports diminished to some eight or ten millions, while we shall import largely, as we did in 1836, and as Great Britain did in 1846. Prices will then be high, and with every increase there then will be diminished power on the part of the labourer to obtain food, with still more rapid diminution in the power to purchase either cloth or iron. The farmers will temporarily profit in the price of food, as they did in 1836, but the ultimate result must be the same. They will lose five dollars in the diminished value of land, for one they will gain in the price of food. Cotton and tobacco planters will also benefit temporarily, at the cost of the consumers of cotton and tobacco. Wages, estimated in articles of consumption, must fall greatly, and immigration will diminish to the severe loss of ship owners. The capitalist will experience a daily diminishing power to invest his capital safely at the ordinary rate of interest, and thus it is that the war upon labour and capital will be made.

With the diminution of the power to invest capital to advantage, there must be an increasing tendency to its accumulation in banks, unproductive to its owners. With every day, the demand for stocks from Europe must increase. In the last half year, our imports have reached, as it is understood, about *one hundred and fifteen millions*, and the debt accumulated against us last year must have exceeded fifty millions, of which about fifteen millions were required for the payment of interest. This year we shall probably go in debt sixty or seventy millions of dollars, for we shall have less to sell and more to buy than in any previous one, and the close of the year will probably see us with a debt of three hundred and fifty millions, involving the payment of more than twenty millions annually for interest. With each transfer of stock, and with each step in the progress of diminution in the power to invest capital safely and profitably, the price of good stocks must increase among ourselves, until at length they attain a point higher than they will command in the foreign market.* Their export must then cease, and the demand for specie must then arise. Our silver is, to a great extent, already gone. Gold must follow, and the demand for only a few millions will open the eyes of bank directors to the fact that they are trading to a vast extent upon the funds of others who will now be able to use them for themselves. Discounts at bank will diminish, and note holders will be forced into the street to obtain at twelve, fifteen, or twenty per cent. the means of executing contracts made when the rate of interest was but five. Then will come THE REVULSION, and then will disappear the "prosperity" of which we now so fondly boast, and how rapidly the one will replace the other may be judged of by those who witnessed the change between the commencement and the close of March, 1837. The few will then grow rich, and the many will then be impoverished. New York, as the centre of speculation, will, as in 1837, first feel the shock, but thence it will gradually expand itself until it shall be felt throughout the Union, and all shall feel themselves involved in one common ruin, the result of the policy of 1846.

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* How soon this state of things will occur it is not for me to predict, but the following passage from the *New York Herald* of Jan. 4, would seem to indicate that it could not be very far distant:

"The spirit of speculation is rapidly extending itself, and speculators are becoming more abundant every day. Prices are advancing with rapid strides, and there appears to be no limit to transactions. There appears to be more anxiety to buy at present prices than when the market ruled ten per cent. lower. All the leading fancies have advanced more rapidly during the two past days than at any previous period during our recollection."

Road makers will then discover that while the roads have been doubled in extent, the quantity of commodities to be transported has been reduced to little more than one half, and that with diminished immigration and emigration the passage business can contribute but little towards dividends. Road-making will then cease, and the half finished roads will pass into the hands of their creditors. Ship owners will then discover that canal-boats, and sloops, and schooners, which furnish aliment for ships, have been steadily diminishing in number. Farmers will cease to have a market for their products among the makers of roads, and will look in vain around in quest of the great market they once enjoyed among the prosperous miners of coal, smelters of iron ore, and manufacturers of cotton and of wool. Wool will then go to Europe in search of the market that has been destroyed at home. All will seek to produce, and production will then increase, and then again shall we see low prices—lower probably than we ever yet have seen, for the new lands now being forced into cultivation will then begin to give forth their crops to the ruin of the farmers of the older States. The planter will then cease emigrating and try to produce something to sell, and then again he will have large crops, with prices lower than he yet has seen.* He will then cease to rejoice in short crops and high prices. The average crop of the four years, from 1842 to 1846, exceeded by 70 per cent. the average of those from 1832 to 1836. Such an increase from 1852 to 1856 would give 3,750,000 bales, but taking it at 3,500,000 bales,† with a domestic consumption under half a million, there will probably be three millions for which to seek a market abroad. At present prices, Great Britain can take a million. At fourpence halfpenny a pound, she can consume about twelve hundred and fifty thousand. At what price she will take two millions time alone can determine, but the planter will have reason to rejoice if he obtain within thirty per cent. of the lowest prices he has yet seen.

With the diminished prices of produce the power to purchase foreign commodities will diminish, and towns and cities will find themselves hopelessly in debt for the construction of roads that are valueless when compared with the cost at which they have been constructed. All will then discover that "competition" has led to *doubling* the roads while *halving* the trade. States will then find it difficult to collect taxes, and the Committee of Ways and Means of the Union will be called upon to show how with a revenue of twenty millions they are to provide for an expenditure of fifty. Poverty at the North will contribute to the spread of the anti-slavery feeling, and poverty at the South will cause the increase of the pro-slavery feeling, and we shall then perhaps be ripe for a dissolution of the Union. Such is likely to be the course of events at home, while abroad vituperation of every thing American will become as common as it was 1842, and such will be the closing chapter of the policy of 1846.

If the reader doubt the correctness of these anticipations, I would request him to study the history of 1836, and try if he can find, in what is now transpiring, any one fact that does not correspond with what then occurred. Let him next study the history of England in 1846, and see the effect of

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* We are now under Southern policy, building up Nicaragua, perhaps to be a rival to Southern planters in the production of their great staple.

"A person in Nicaragua writes that cotton may be cultivated there to any extent, though the want of energy in the inhabitants has reduced the production to a very small quantity. In a single year as much as 50,000 bales, of 300 pounds each, of clean and excellent quality, have been exported."—*Daily News.*

† The excess of the crops of 1842 to 1846 over that of 1837–8 was about twenty-five per cent. A similar excess of these four years over the crop of 1847–8 would give above 3,400,000.

the road-making mania there, and then let him read the New York Herald for the opinions there expressed in regard to the conduct of nearly all the merchants of England to whom our citizens were so unfortunate as to consign cargoes, or for whom they were so indiscreet as to make purchases. Like causes produce like effects. *In writing the history of* 1852, *I have only re-written our history for* 1841.

The radical error of the British system, which it is the object of that of 1846 to establish amongst us is, that it is opposed to the first and best feelings of man, the love of association. Man seeks to combine his efforts with those of his fellow man, whereas that system looks to preventing all such combination. It would separate the saw-miller and the grower of timber by thousands of miles. It would compel the farmers of the world to carry their wheat to England to be ground. It *did* compel the planter of India to send his paddy to England that it might there be converted into rice. It does compel the cotton and wool growers of the world to send their products thousands of miles that they may there be spun and woven, and the sugar planter to send his sugar that it may there be refined. It seeks everywhere to destroy the power of association by separating the producer from the consumer of his products, and to compel the farmer to pay all the cost of transportation. It limits the consumption of iron, and thus impedes the advance of civilization. It compels the farmer and the planter to waste on the road the manure that should be returned upon the land. It compels hundreds of thousands to be idle where they should be employed. It has destroyed the productive powers of its colonies. It has made of Ireland one vast ruin. It has destroyed and is destroying Scotland, and of England itself it is gradually making one vast mass of poverty, demoralization and crime. The object of the tariff of 1842 was the destruction of the monopoly to which these effects are due. It sought freedom of trade in the only direction in which it can ever be found. It sought to raise the condition of our people, and to promote the immigration of Europeans who should be raised to a level with our own. The object of the tariff of 1846 is the perpetuation of the monopoly which seeks to maintain itself under the cry of "free trade." It seeks to sink our people to the level of those of Europe, and it destroys the inducement to Europeans to seek our shores, compelling them to remain slaves when they would become freemen.

The object of the tariff of 1846 and that of the universal British system is that of establishing "competition" and rivalry, leading to the destruction of the productive powers of man. The object of protection is to obtain for mankind the permission to combine their efforts for the increase of their pro ductive power and the improvement of their common condition. The one looks outward, and all its movements tend to war and heavy expenditure. The other looks inward, and leads to peace and moderation of expenditure for governmental purposes. The one looks to building up a great monied aristocracy like that of Britain, while the other looks to the extension of sound democracy—perfect self-government.

If we would desire that we ourselves should enjoy freedom, whether of land, labour, or trade, we must seek it in the direction of efficient and perfect protection, and such will probably be the decision of the whole people north of Mason and Dixon's line, after the convulsion of 1852. If we desire that the freemen south of that line should become rich and that the slaves should become free, our object must be sought in the direction of the tariff of 1842.

The productive power of the country was estimated by Mr. Walker, three years since, at three thousand millions of dollars, and its capability of increase at a duplication in every twelve years. According to this calculation,

it should now have reached thirty-six hundred millions, and yet, with all our vast increase of population we produce less of every thing required for the use of man than we did then—less cotton, sugar, rice, tobacco, hemp, wool, grain, cloth, iron, &c. Even had all remained stationary we should have here a loss of annual production equal to six hundred millions of dollars; but if to this be added all the vast reductions, how immense is the loss to the nation from the adoption of the policy of 1846!

To say that the nation is this day poorer by one thousand millions of dollars than it would now be had the policy of 1842 remained unchanged, would appear to be saying much, and yet it is a small amount compared with the truth. Had the manufacture of iron been permitted to extend itself, we should have used in the last four years at least a million, and probably a million and a half of tons that we have not used, and should now have throughout the country that quantity in the various machines of production, conversion, and transportation, and the reader may judge what would be the effect on the value of land and labour resulting from the existence of mills, furnaces, mines, roads, and other aids to labour, to that extent, and determine for himself if the difference in the value of the land alone would not be more than that sum.

Had the manufacture of cloth and iron and the mining of coal been permitted to advance as they were then advancing, we should now consume at home treble the food we export, and almost twice the cotton we now consume, and we may judge if the *additional* value thus given to food and cotton would not now count by hundreds of millions of dollars.

Had the demand for labour been maintained, we should have imported in the intermediate period at least twice the men we have imported, and should now have a million of people more than we have done, and it is man that gives value to land.

To the protective system we are bound to return, either in season to prevent a revulsion, or after having passed through it. If before, we shall stop short in our downward career, contenting ourselves with the losses already made. If after, it may safely be said that three thousand millions will not compensate for the losses resulting from the policy of 1846. That we must return to it must be obvious to all who will examine the facts and satisfy themselves that capital is becoming daily less and less productive, that labour yields a daily diminishing return, and that the power of producing the things needed for the support and comfort of man is in a steady course of diminution.

It remains for those who are intrusted with the law-making power to determine whether it shall be before or after, and upon the decision now to be made hangs probably the question of the continuance of the Union. Poverty produces discord and disunion, as has been seen in the growing pro-slavery feeling of one section of the Union, and anti-slavery feeling of the other, growing out of the troubles consequent upon the working of the compromise tariff. With another such revulsion, there will be increased bitterness of feeling, both North and South, and whether or not the Union can stand such a state of things, time alone can determine. That it cannot do so is my firm conviction, and as firm is the conviction that good feeling between the two portions of the Union can never be restored until the planter shall determine to avail himself of the advice of Adam Smith, in adopting energetic measures for bringing the machinery of conversion to the cotton fields and enabling himself to export cotton and food in the most compact form, and thus annihilating the power of England to fix the price of all she buys and of all she sells. That measure will diffuse real prosperity throughout the land, and with prosperity will come peace, harmony, and union, to be followed by real freedom of trade.

ANALYSIS OF THE ASHES OF THE SUGAR CANE.

MR. EDITOR—*My Dear Sir:* Knowing that some of your readers would take an interest in the following results upon the *ashes of the sugar cane*, obtained by Mr. STENHOUSE, I have been at the pains to condense them from a very valuable memoir published by this gentleman in a supplementary number of the London, Edinburgh and Dublin Phil. Magazine and Journal of Science (No. 183, Dec. 1845, p. 533), and herewith offer them to you, with a remark or two of my own, provided they meet your views.

SUBSTANCES.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Silica	45·97	42·90	46·46	41·37	46·48	50·00	45·13	17·64	26·38	52·20	48·73	54·59
Phosphoric acid	3·76	7·99	8·23	4·59	8·16	6·56	4·88	7·37	6·20	13·04	2·90	8·01
Sulphuric acid	6·66	10·94	4·65	10·93	7·52	6·40	7·74	7·97	6·08	3·31	5·35	1·93
Lime	9·16	13·20	8·91	9·11	5·78	5·09	4·49	2·34	5·87	10·64	11·62	14·36
Magnesia	3·66	9·88	4·50	6·92	15·61	13·01	11·90	3·93	5·48	5·63	5·61	5·30
Potassa	25·50	12·01	10·63	15·99	11·93	13·69	16·97	32·93	31·21	10·09	7·46	11·14
Soda	.	1·39			0·57	1·33	1·64			0·80		
Chloride potassium	3·27		7·41	8·96				10·70	11·14		16·06	0·84
Chloride sodium	2·02	1·69	9·21	2·13	3·95	3·92	7·25	17·12	7·64	4.29	2·27	3·83

Nos. 1, 2, 3 and 4 were very fine, full-grown canes from Trinidad, consisting of stalks and leaves, but without the roots; Nos. 5, 6 and 7 were similar canes from Berbice; No. 8 from Demarara; No. 9, of full-grown canes, but with few leaves, from the island of Grenada; No. 10 from Trelawny, Jamaica, consisting of transparent canes in full blossom, grown about six miles from the sea and manured with cattle dung; No. 11, of transparent canes from St. James's, Jamaica, growing about two hundred yards from the sea, being old rattoons, and also manured with cattle dung; No. 12, young, transparent canes three and a half miles from the sea, and manured with cattle dung, guano and marl.

From these analyses, it appears that the cane for successful cultivation requires a very large quantity of silicate of potassa and also a considerable amount of the phosphates. Few cultivated plants, except the cerealia, require so much. Wheat, or any of the cereals, necessarily causes the removal of a portion of the valuable inorganic constituents of the soil, such as the alkalies, phosphates, &c. which can only be returned to it indirectly; but with sugar the case is quite otherwise. Sugar is a purely organic substance, consisting of carbon and the elements of water, all of which can be derived from the atmosphere, and contains neither alkalies nor phosphates; so that if the ashes of the canes were carefully collected and returned to the soil in an available state, there is no reason why cane might not be grown upon the same lands almost indefinitely.

In the West Indies, where wood is scarce, the crushed canes are employed as fuel, under the coppers of the boiling-house, to concentrate the syrup, and as the heat required is great, a large amount of the silica and the alkalies present is converted into a hard, insoluble glass, which in this form being useless, is thrown away. We can therefore readily understand the reason of the rapid exhaustion of their sugar-lands, and the comparatively slow wearing out of those in Louisiana, where from the abundance of wood, the cane-trash is never thus employed, and where in addition to the inorganic ingredients of the cane, the soil receives (at least where the plantership is what it ought to be) the almost equally valuable mineral constituents of the wood itself.

Yours, very obediently, CHARLES UPHAM SHEPARD.

LONGEVITY IN HORSES.—The Marquis of Ramecroix has just lost an Arab mare, by death, which was sixty-three years old, but which of course had long been useless. Mr. Jesse Hill, of Cheddar, the steward of the Marquis of Bath, has a mare he is ready to prove to be in her fiftieth year. She is daily used in harness, her chief food being bran, potato rinds and grass.

OKRA:

SOMETIMES CALLED GUMBO, BEING MUCH USED IN WHAT, IN NEW-ORLEANS, THEY CALL GUMBO SOUP.

Several vegetables, now very popular, and some, though of great value, still comparatively but little known, have been introduced within our recollection.

The second day of April was the thirty-second anniversary of the first periodical ever attempted in the United States, whose express object was (without any support or the promise of it at the time) to collect and disseminate facts, and to awaken throughout the country a spirit of inquiry and of improvement in Agriculture, Horticulture, Rural and Domestic Economy, and Internal Improvement.

In the very first number and first page, was published from the pen of the celebrated William Cobbett, a paper on "the mode of preserving, and the uses of the *Ruta Baga*, beginning with a *description of the plant.*" From this fact, the reader may form some idea of the progress which has since been made in the introduction of new plants, and the extension of horticultural knowledge. The fact is, that though at that period the Swedish, or as it was at first called *Prussia* Turnip, was more familiar to the people in New-York and east of it, the plant itself was far from being known generally. We are not sure that much if any thing better has been written about this sort of turnip, from Cobbett's time to the present day; but under a persuasion of which we cannot divest ourselves, that *root culture* may be profitably pursued to a much greater extent than it is in this country, notwithstanding our liability to droughts, and the high price of labor; we shall not stop until we have given, as to all of them, that full practical information which it may be supposed every young farmer at least would like to have within his reach, and which, on their account, will be tolerated by farmers of more experience. Why is it that we feel so strongly persuaded that turnips might be made here in a great measure, as in England, subservient to the better maintenance of stock, and of course to the improvement of our lands? It is by reference to the very heavy crops, made with and without the stimulus of premiums, which we have ourselves recorded from time to time for more than thirty years; and because we have reason to believe that Mr. Sotham of New-York, and Farmer Webster of Marshfield, who regard them as cardinal points in good husbandry, (as well, doubtless, as many others,) always count with certainty, and without disappointment, on *good saving crops of Ruta Baga from year to year*, as a regular thing. But then they take care, as every good farmer will for *every crop*, to manure well—to put the land in proper tilth—to sow good seed, and to *sow in good time.* True, a late sown crop may occasionally hit; we once knew a heavy crop of common turnips from seed sowed on the 10th of September—a thing we noticed when not more than twelve or fourteen years old; but we have also noticed, as Cobbett says, that "*God is usually on the side of the early farmer!*"

But we were speaking of vegetables introduced within our recollection. Of these the *Tomato* is one, and the Vegetable Marrow another. This last was first sent to this country, to the writer, by the Hon. Joel R. Poinsett, of South Carolina, we believe from Chili. To these may be

added, as of more recent appearance, the *Rhubarb*. But if called upon to designate the most valuable vegetable after, if not before even the Tomato, one which, considering its great value and *adaptability* to general use, has been most slowly popularized, it would be the one which stands at the head of these remarks—the *Okra!*

When residing some years since at Washington, as Assistant Post-master-General, appointed under Harrison, we were called on to pronounce the annual Horticultural Address; and being as ever desirous of turning the occasion to a *useful*, rather than clap-trap purpose, we called attention to this neglected vegetable, and even gave in the midst of the discourse a good *housewifely recipe for cooking it.* Though then rarely to be seen, it has come since into much more general cultivation and favor at Washington. But what we particularly desire now is, to make more generally known the interesting fact that the *dried okra* offers a capital material for a most delicious vegetable soup in mid-winter. Passing in February last through the Washington Market, we saw an old colored woman with an open bag of something that looked as dry as a basket of chips. It was *okra*, that in season had been cut into thin slices, and dried as the good housewife dries her peaches. Unpromising as it looked, a quart of it was bought, and with it a knuckle of veal well cracked, by that capital mutton butcher, Mr. Miller; and a more delicious plate of soup need never be tasted than these materials afforded that day, at the round-robin table of F. G. S. of that ilk; on tasting it—Here, thinks I to myself, is a means, perfectly within the command of every farmer in the country, however remote from market, to have in mid-winter, almost without cost, a tureen of the choicest soup—such as would of itself well serve as a substantial dinner for a dozen. The plant is as easily raised as garden peas, and with an old fowl, or, if near market, a small piece of thin flank of beef, or beef or veal bones well cracked, with this nutritive and mucilaginous vegetable, will always afford a most palatable meal—one which, being once tasted, will never be refused.

To Destroy the Green Fly.—I have used garden-pots for this purpose for these ten years. The *modus operandi* is to put a quantity of coke, coal, or short pieces of wood made red hot at the bottom of the pot, and then on these the tobacco paper. That which I use is picked into small pieces before it is put on the hot cinders. The pot is then placed where it is wanted, and the embers blown with a pair of bellows, whose nose is introduced through a hole in the side of the pot near its bottom. I now recommend the use of a porridge pot (in Scotch vernacular)—a tar kettle or plumber's pot (in English). I punch out three holes in its bottom, one inch in diameter, and these afford means for a current of air to pass through the fuel. Such an apparatus is easily obtainable, and being cast-iron will last and answer the purpose perfectly for very many years.—*Cuthill.*

Lamb Lettuce, or Corn Salad.—I apprehend that the merits of this homely plant are not so well known as they should be. It forms a first-rate ingredient in a salad, and is, I believe, an excellent purifier of the blood. Being a native of Britain it is very hardy, and, if sown in July, August, and September, an excellent succession of it will be kept up during the winter. Then sow again in spring. If a large frame can be spared, the best plants might be taken up with balls and planted thickly in it. The cultivator could then have it at command. I have never blanched it, and therefore cannot say whether that would improve it or not. Sow in beds or rows 6 inches apart; thin out afterwards to 6 inches in the row. It will afford many cuttings, if not cut down too closely.—*Cuthill.*

SHOULDER LAMENESS IN HORSES, COMMONLY CALLED SWINNEY.

It is matter of regret that we cannot find room for the whole of a communication from E. Mitchell, of Chapel Hill, North Carolina, who asks information respecting an ailment of horses, prevailing in certain parts of North Carolina, and which he believes is more common in the western parts of that State and among the mountains than elsewhere. It may be that the rough and hilly nature of the country may have some connection with it, and this apprehension is somewhat strengthened by the fact that such regions not being generally within the sphere of observation of veterinary authors, we see by them little or no mention of the disease. In the region referred to as within our own observation, it is commonly called the "Swinney," or "Sweeny."

Mr. M. thinks it may be alluded to in Skinner's edition—the last—of Mason's Farrier at page 230, article 76. All that Mr. S. was called upon or attempted to do with Mason's Farrier, was to supply the supplement to that work.

Mr. M. very clearly describes the ailment, as a soreness or weakness in one or both of the fore legs, accompanied by, and probably depending upon, a diminution of the muscle or muscles covering the shoulder-blade, creating an unnatural flatness, or perhaps more commonly a hollowness there, as if hollowed out by a gouge. The animal, once affected by it, he thinks rarely ever perfectly recovers. We have heard of cases being cured by being pricked through the part affected to the bone, on the principle, perhaps, of counter-irritation; but we are surprised, on examination, to find in the books so little if any thing in particular description of this disorder of a point, in the frame of the horse, which all agree to regard as above all others important. The appearance and effects of the disorder are very intelligibly and accurately described as it has fallen under our own observation; and disappointed so far in obtaining the desired information as to the causes and cure of it, we have ordered a costly work from England of recent date, on "Lameness in Horses," in the hope of finding what is needed; in the mean time, we solicit from our readers the favor of any light they can throw upon the subject.

We had intended in this number to describe the form and qualities of the Farm Horse; but reflecting on the great importance of the shoulder, in the anatomy of the horse, and how necessary is a thorough knowledge of its form and functions in the choice of horses for particular purposes, we have deemed it more *useful*, though not so entertaining as would be a more common dissertation on the general structure and proportions. Our desire in fact is, to justify (though we have little hope of its being realized) the good intention of a distinguished patron of this work, J. A. Hamilton, Esq., who says in a recent letter: "Please to carry the above check for $10 to my credit as a means of getting the *Plough, the Loom, and the Anvil* into circulation in this neighborhood. I intend to place it, if I am permitted to do so, in the library of one or more of our common schools. The children will take the numbers home with them, and their parents will be disposed to read them. Having looked into them, and not having leisure to go through them, I believe they will become subscribers in order to have the advantage of so excellent a work."

Whether introduced into the schools or not, we intend that it shall be impregnated with such elements of *useful* knowledge to every farmer,

that it *ought to be so introduced!* yes, it *shall be* of that character and tendency, that if read at school, or by the sons of planters and farmers any where, they shall imbibe from it not only useful knowledge, profitably available throughout life, but they shall be inoculated with a spirit of curiosity and research, into subjects allied to their pursuits, that shall make them in after life, not merely better informed farmers, but better and happier men,—for we will lead them, to the extent of our humble capacity, in all their gettings to *get knowledge* and to esteem it as above all price. Reader, you are not to suppose that with us, this is any newly born passion or conceit, prompted by avarice or ambition. No! of a thousand similar proofs that we could offer to the contrary, take the following, dictated *thirty-two years* ago by the same head and heart that is addressing you now, on offering an extract from GIBBON in which he truly says that "Agriculture is the foundation of manufactures; since the productions of nature are the materials of art":—"It has been the misfortune of our country to look upon agriculture as a grovelling vulgar pursuit. Thus men of fortune have devoted their best educated children to what are emphatically termed the '*Learned Professions*,'—leaving to the most neglected and illiterate the cares and the interests of husbandry. Fortunately for the reputation, not to say the salvation of the Republic, we begin to form a more just estimate of the dignity and the rational and varied delights of agriculture. We begin to see, that the most beautiful and enlightening sciences are connected with, and necessary to the successful operations of the plough and the pruning-hook."

Alas! the progress has been rather slow, but let us hope that we are on the right road. To return to our subject—it will be admitted as of the highest importance, that every farmer should be well versed, not only in the form and properties of domestic animals, their breeds, diseases, &c.; but he should carry such knowledge into greater detail and more refinement as respects the *horse* than any other. In that animal, according as he is destined for different purposes, his shoulder is the first point to be examined; and it is only after the following lecture on that single point has been carefully read that we would propound the question: Is it not of the highest importance that our boys at common schools, on leaving them and entering upon the business of agriculture, should possess a knowledge of the facts and principles laid down in the following chapter (from Percival's "Lectures on the Farm and Action of the Horse") on

THE SHOULDER OF THE HORSE—ITS FORM AND FUNCTIONS.

No individual part of the animal frame, in the estimation of horse-people, calls for greater demands on their judgment than this: a good or a bad shoulder is held to be of paramount importance to the animal's riding or going in such a form as is pleasant to his rider, and as tells in action and safety as regards himself. The connoisseur steps up to the horse for sale, in his stall, and by simply carrying his eye over his shoulder and placing his hand upon his withers, determines at once his qualifications, either for saddle or harness, and whether he be such a nag as is likely to suit him for the purposes he requires. Before, however, I attempt to show by what art this "judge of horses" so summarily and surely arrives at this point of discernment, it will be necessary for us, first, to dissect the shoulder and examine its component parts; and, subsequently, to endeavor to analyze and understand its action in progression.

In the skeleton, the shoulder consists of two bones—the *scapula* and the *humerus*. The scapula or blade bone—the same that we find in a shoulder of mutton—is the proper shoulder-bone; the only one in man and the monkey tribe which constitutes the shoulder; the humerus being—as its name indicates—the *arm* bone:

in the horse, however, and in other quadrupeds, both bones go to the formation of the part we call the shoulder. In an anatomical point of view, the fore leg of the quadruped corresponds with the *arm* of a man or a monkey; hence arise such differences in their structure as we might expect to find from knowing how vastly unlike they are in their economy; the arm of the quadruped, in fact, becomes a leg, the hand a foot; and the offices of both altogether transposed. A man has it in his power to crawl or walk upon his hands and feet somewhat after the manner of a quadruped; a monkey does so by nature, at the same time that he possesses the power, to a certain degree, of erecting himself and walking upon two legs like a man, and using his fore limbs after the manner of arms: although, however, the monkey makes use of his upper or anterior extremities in this double capacity, neither in progression nor manipulation is he any thing like so perfect as quadrupeds on the one side and man on the other. It is the set-off of the humerus from the body—its connection with the trunk by the head alone—which, with a somewhat different formation of joint between it and the scapula, enables the bone to perform all the various motions we see the arm of a man capable of: whereas, confined and bound to the side of the ribs, as we behold it in the quadruped, it is simply susceptible of playing backwards and forwards, or, at least, of very little other kind of motion.

The scapula, being a broad flat bone, presents two large surfaces; an inner one, which is uniform and smooth, and a little excavated in order to adapt it the better to the convexities of the arches of the ribs, against which it is applied; and an outer one, having a longitudinal ridge running upon it, unequally dividing it into two smaller surfaces. Between the scapula and the ribs there is no joint—neither osseous nor ligamentary connection, but only a fleshy one; muscles alone attach the shoulders to the body; and as the body is supported anteriorly by the fore limbs, it follows that thus much of the weight is borne by muscular action, or, at least, by muscles becomes transmitted to the legs or pillars of support. A man by passing a knife between the scapula and the ribs would easily sever these fleshy attachments, and in this manner let fall the fore part of the trunk, and the head and neck along with it, to the ground. This constitutes the essential difference in their relations with the body between the fore and hind extremities: while the latter are connected to the trunk and support the hind parts of it through the medium of joints, the former hold the body suspended, as it were, between them through the intervention of muscles.

The scapula is a bone of a triangular shape, having two long sides and one short: the latter, known as its *base*, is *in situ* turned upwards; its opponent angle, obtruncated and corresponding to the apex, being turned downwards. The position of the bone in relation to the body is oblique; its basis lies as far back as against the seventh rib, while its apex is protruding forward enough to be opposed to the first rib:* at least this appears to be the common situation of the bone, it being evident that any increase or decrease of obliquity must alter its relative apposition as regards the ribs. We see horses with oblique shoulders, and with straight or upright shoulders, and we shall find that the scapula varies in its degree of inclination very materially in these two cases; and that this variation constitutes one especial point on which depends the "goodness" or "badness" of the horse's shoulder. Before, however, we can comprehend the advantages and disadvantages of certain positions of the scapula, it will be necessary for us to examine, both in and out of its situation, the other component bone of the shoulder—the *humerus*.

This is one of that class of bones termed *cylindrical;* and cylindroid, though irregularly shaped, it is. It is surmounted by a spherical top, whose surface, the segment of a globe, is smooth and polished, evidently for the purpose of playing, after the manner of a spherical hinge, within a cup-like concavity, occupying the place of the apex of the scapula. There are no two bones in the skeleton whose articular connection is of a nature to admit more varied and extensive motion than exists between the scapula and the humerus. Let a man take a horse's fore-leg in his arms, and he will find that he can not merely bring it forward and carry it backward, but can also, to a considerable extent, make it perform a sort of rotatory motion; and this, the latter especially, he is enabled to effect in consequence of the mobility existing in the joint formed between the ball or head of the humerus and the socket in the lower end of the scapula.

The power of throwing the leg outwards or inwards in action, of turning the toe out or in, of performing those motions in the manège called *passaging* or *shouldering-in*, mostly resides in the rotatory motion possessed by this joint.

Viewing the relative positions of the bones of the fore-limb in the standing posture, we perceive that the two composing the shoulder constitute, *in situ*, an angle of an obtuse character having two sides; a superior, formed by the scapula; an inferior and shorter one, by the humerus: the point of the angle being turned forwards. This oblique or angular arrangement is attended with several manifest advantages. A larger extent of surface upon the side of the body is occupied and embraced by the bones so disposed, thus affording more extensive and firmer attachment of the limb to the trunk. At the same time that this angular apposition better insures their connection with the ribs, it likewise affords the bones facility of motion upon each other without risk of disseveration or detachment from the sides of the chest; for the movements of the shoulders, which in action are considerable, have to be carried on, not only while the foot is off the ground, but at a time when all the weight of the body is imposed upon them. Another advantage of the angle is the extensive bordering and powerful leverage offered for the attachment and operation of muscle. Had the bones of the shoulder been placed upright or perpendicularly, one upon the other, in the first place, they could not have been made any thing like their present length; in the second, their connection with the body would not have been equally secure; and in the third place, their movements upon each other must have been comparatively restricted, giving rise to something in the form of action in the fore-limbs, a great deal worse than that paddling sort of going which we denominate "pinned in the shoulders." This will appear more intelligible after we have shown what is the nature of the motions or action of the shoulders.

The muscles attaching the scapulæ to the sides of the chest impart to the shoulders that strength which enables them to support the fore parts of the animal machine, and move under their burthen with a facility that no joint or other contrivance could have afforded them. The scapula or blade-bone, in the position we behold it while the horse is standing, possesses—in relation to an imaginary line let fall perpendicularly from the withers (see cut, C D)—a degree of inclination or obliquity which varies more or less almost in every individual: one horse is said to have shoulders *oblique*, another to have them *straight*, depending on the more or less inclined position of the blade-bones; and the former is valued as a riding-horse, and justly so, while the other is condemned and rejected. The reason of this will appear evident when we come to learn that every time the shoulder is put in motion the scapula makes a sort of partial revolution on its own centre or axis, which at first slightly depresses, but instantly afterwards elevates and advances its base or upper part, while its lower part or obtruncated apex, which was at the commencement of the movement advanced, recedes until the scapula has nearly or quite revolved into a straight or upright position. The more oblique the original position of the scapula the greater will be its revolving sweep, and the more free and extensive the action of the shoulder, as will appear evident from the following diagram:—

Taking the graduated quadrant A B to represent the arc the scapula describes in

its imperfect revolution, it is manifest that, setting the limit of its motion forward at the figure 1, its sphere of revolution will be increased in proportion as its inclination or obliquity is greater at the commencement: a scapula whose base inclines to number 7 in the scale will have two degrees of extent or action more than one which only reaches number 5, and two less than one whose base descends so low as the 9th degree.

The first movements of the shoulder-bones, those that lift the limb off the ground and advance it, consist in a limited revolution of the scapula, in which its base turns backward and downward, its apex forward and upward, and in a simultaneous flexion and elevation of the humerus, the effect of which is to diminish the distance (represented in the cut by the dotted line E) between it and the scapula. The projection of the limb in front of the body is effected by an extension of the humerus on the scapula, and, in rapid or forced movements, by an advance (not a revolution) of the scapula as well: but the instant the foot is grounded and becomes a fixed point and fulcrum, the scapula commences a counter-revolution, its base moving forward and upward, its apex backward and downward, and the humerus returns to its original semi-flexed position. Whether the limb moves upon the body, the foot being off the ground, or the body moves upon the limb, the foot being on the ground, in either case the scapula is in motion, its revolution in regard to its summit being backward and downward in one case, forward and upward in the other

The length, as well as the obliquity, of the scapula will have an influence on the action of the shoulder, it being manifest that a body revolving upon its own centre must describe arcs or sweeps great in proportion to its length; hence the value of a deep shoulder: though, as regards the scapula itself, the muscles attached to and moving it will necessarily be short in a case where the bone is disproportionately long, and *vice versa*. When the scapula is placed nearly upright, or is of disproportionate shortness, there cannot be that extent or freedom of action in the shoulders; neither can there be that projecture of the limb that there is in opposite conformations. The movements of the fore limbs are likely to be confined or imperfectly effected, and where those of the hind limbs happen to be "good," or of a more perfect kind—as is not unfrequently the case—there will be great danger of the horse being, by the comparatively superior action in the agents of progression, precipitated forwards.

A good shoulder not only possesses depth and obliquity, but, to complete its perfection, "lies well into the body." How often do we discover upon the superficies of the shoulder a rising a little below and behind the withers, marking the situation of the summit or base of the scapula. In the generality of instances this arises from the ribs being arched in that part, which precludes the possibility of the scapula being properly accommodated to them: a flattened body applied against one that is convex must necessarily project as the latter recedes from it; and the only way in which this can be obviated is, either to diminish or alter the convexity, or to give to the straight body a concave form; both of which accommodations are seen exemplified in what we call "good-shouldered horses." The rising is caused by the top of the scapula standing out from the convexity of the ribs. Where this is not the case, the surface appears and feels uniformly level, and where muscles or fat abound, is so smooth that we in vain seek the traces of the scapula through the skin. The uprightness and the length of the scapula likewise, in some instances, operate in producing the rising. In any case, the unevenness betrays mal-proportion or mal-apposition of parts; in other words, would not be present if all had been formed and fitted to perfection.

A shoulder, then, that possesses depth, obliquity, and uniformity, is said to be "good;" and for the purposes of those springy actions and paces which are most agreeable to and admired by the rider, good it most unquestinably is: it is good for action, good for speed, good for spring, and as a point of beauty is veritably indispensable. Still, though this be confessedly the prototype, we are not to set all other kinds and descriptions of shoulders down as faulty and objectionable. For the carriage of heavy burthen, and for heavy draught, I believe a straight or upright and rather short shoulder, provided it possess the necessary substance or muscularity, to be advantageous. Laborious draught does not admit either of a horse taking long steps or of going at any but a slow pace; and on abstract mechanical principles, a horse whose shoulder is short and upright is capable of supporting more weight upon his fore limbs than another in whom it is lengthy and oblique. The sharper the angle formed between the scapula and the humerus, and again between the

humerus and radius, the weaker, as props of support, must the fore limbs be considered. A horse, therefore, with a short upright shoulder is, *cæteris paribus*, actually stronger in his fore parts than one possessing what we might call a good or handsome shoulder. Here, in fact, as in many other instances that might be mentioned, we have on the one side *action*, and with it spring—on the other, *strength;* and as I said before, for cart or dray horses, where heavy draught is required, or for animals wanted to carry heavy loads, the short and upright shoulder is to be preferred to the lengthy and oblique structure.

The connoisseur is quite correct in his observation: "Such a horse cannot ride, *short* and *straight*—for the two properties are commonly associated—as his shoulders are;" but let him not on this account reject the animal as useless. It is, as I said before, the sort of shoulder for harness, and for supporting weight, providing it possesses the required muscularity, and providing the horse has action with it; for, be it observed here, though action may be regarded as the natural product of an oblique shoulder, yet are there many instances where it is found to result from opposite conformations, as well as instances of its absence where one would from appearances prognosticate it to be present. This discrepancy between form and action it is that is so often baffling our judgment and furnishing us with physiological problems, which, on too many occasions, we find ourselve unable to solve; nevertheless, the subject, intricate and difficult as it is, shall receive some attention when I come to speak of "action."

Let the action of the horse be what it may, however, should the shoulders be upright, we may be certain of the loss of spring in his movements being such as to make him any thing but easy or accommodating in his paces to his rider. He is complained of as being "a rough trotter"—"a bone-setter;" and the higher his action happens to be, the greater will be the concussion. Mr. Youatt has compared the spring produced by the play of the scapula upon the humerus to the spring of a carriage; and in its operation it is a happy illustration of this piece of animal mechanism; the only difference being that in the coach-spring the elasticity resides in the steel of which the spring is manufactured; whereas the bones derive their spring from the elasticity of the material—ligament—by which they are connected together, and of that—muscle—by which they are united to the body.

We have been considering the *depth* of the shoulder and the *position* of the bones composing it, and in the course of our inquiries have noticed its *substance* or *muscularity;* we will now explain what we mean by

Thickness and Thinness of Shoulder, and investigate the relative advantages and disadvantages of these counter-formations. A notion very prevalent among horse-people is, that the shoulder cannot be too thin or "fine," as they call it; and that a thick or "loaded" shoulder is only fit for harness. In these remarks truth is mingled with error, and it shall be our business to endeavor to distinguish and separate them. To set about our investigation systematically, let us first inquire what constitutes this *thickness* or *thinness;*—to what kinds of conformation the terms are applicable, or what they are commonly used to denote. A person grasps the withers of a horse with his hand, and at once pronounces his shoulders "thick" or "thin:" *thin* or *fine*, should the withers stand high and can be included between his fingers and thumb; *thick*, should the withers appear buried between the shoulders, or be so broad across that the span of the hand can with difficulty grasp them: in the former case we grasp nothing but the spinous processes of the dorsal vertebræ; in the latter, we appear to include the scapulæ as well; hence the thinness in one instance, the thickness in the other. There exists in such horses either inordinate length or shortness of spinous processes, inordinate length or shortness of scapula, or an unusual height or lowness of one or both of them, *in situ*, owing to their position. "The razor-back," as it is called, is the most remarkable instance of inordinately long spinous processes, and this is commonly combined with obliquity, and consequent lowness of the base of the scapula: altogether presenting an example of "a *fine* shoulder;" though of one that often proves on examination to be strangely deficient in substance. These razor-backs and fine shoulders are frequently seen in very old horses; indeed, it is a common observation, that "shoulders grow fine with age;" the interpretation of which appears to be, that the shoulders participate in that general process of absorption which is known to pervade the animal frame during the decline of life. In young horses, at the growing time of life, the shoulders are thick by nature, and do not, until the adult period is completed, attain that degree of thinness or fineness which they in after-life are found to possess; coupled with which fact, and in corroboration of it, stands the observation so current among breed-

ers and dealers, that their colts are certain to "rise" and "fine" in their shoulders; and which is now, by all purchasers of young horses conversant in such matters, received as a general law of Nature, to which exceptions are comparatively rare. In my next lecture I hope to be able to show, in a statistical manner, to what extent, and at what, age, such growth may be expected to take place: in the meantime I would observe in reference to it, that it appears to consist mainly or entirely of a shooting up of the spinous processes of the vertebræ. We see the colt with thick clumsy shoulders in consequence of his scapulæ reaching as high as the tops of his spinous processes: we examine him grown to a horse, and find him with finely formed shoulders—with scapulæ no higher than they ought to be, and with withers admirably raised; and, withal, we discover on admeasurement that he has actually risen one or two inches in the withers after, to a common observer, he might have been supposed to haveattained his perfect growth.

GREAT CROP OF CORN.

On respectable evidence of disinterested gentlemen, as appears by the *Ohio Cultivator* of the 15th of February, 1851, Capt. James S. Matson, of Fayette county, Kentucky, grew on an acre of land a crop of corn, that, on the 19th of December, 1850, yielded upwards of 34 barrels, or more than 170 bushels. In Kentucky, the farmer does not take the trouble to put his corn under lock and key. Every thing has as much as it wants, and looks fat, well grown and happy—more especially the negroes, as it seemed to us. They looked as greasy and contented as if the State belonged to them.

Can you say, Mr. Editor, whether Agricultural Societies that prohibit discussion as to political causes of low prices and a losing market, will go on giving silver cups for pampered hogs and acres of land where the produce costs more than it comes to? It strikes me that it would do more good to melt these cups all into one, and offer them for the best new and economical labor-saving implement, or for the most minute and best arranged actual exhibit of outlay and income on some well-known farm; that young farmers might be so instructed how to make exact and reliable calculations of profit and loss. Let well-bred merchant farmers—such as Delafield, of New-York, or Mr. Reynolds, of Maryland, or Mr. Payton, of Richmond—be appointed to examine the statement and award the premium.* How long shall it be true, as said by that veteran and accomplished writer, Edward Ruffin?—

Reference to most of the lists of premiums heretofore offered by societies, will show that a large proportion of them are for practices which will insure a loss to every competitor—unless the premium itself shall be deemed a reimbursement to its winner, only. Subjects of this class are such as the most productive acre (or other small space) of corn, wheat, rye, and of various other crops—and for the finest (which is usually understood as including the qualities of largest and fattest) ox, cow, hog, sheep, &c. To obtain such premiums, enormous products have been raised on many particular acres; and many animals (of good breed and form it is true) have been pampered from their birth, and carried to astonishing degrees of size and of fatness. For such and approximate results, hundreds, possibly thousands of premiums have been awarded by the numerous Agricultural Societies of the Northern States, and the few in the Southern. And yet, unless to gain another such premium, never has any of these particular practices been repeated by the successful competitors, or imitated by any other person—and for the sufficient reason, that both such cultivation and such manner of feeding are of more cost than profit.

* Note here, by the Editor.—He so cordially approves this suggestion, that he will add to the premium a copy of the best single volume in print—in his estimation—Von Thaer's Principles of Agriculture, and a year's subscription to the Plough, the Loom, and the Anvil.

From the Albany Cultivator.

OF PLOUGHS AND PLOUGHING.

EDITORS OF THE CULTIVATOR:—When I began farming, I found that my lands had never been ploughed over four to five inches deep. By long use of the plough, and the oft-repeated pressure of the cattle's feet in furrows of this depth, a hard crust or *pan* had been formed, through which the roots of the grasses and other crops did not penetrate. Not being able by my own reflections to discover any good reason why the roots of my crops should be confined within so narrow limits, and finding that the standard authorities in agriculture almost invariably recommended deeper ploughing, I resolved at once to give the crops a greater range of pasture. Each field, in its regular order, was accordingly broken up six inches deep. The additional soil thus brought to the surface was allowed to remain there, subject to the influences of the atmosphere, and of good cultivation. When the fields were ready for the next rotation, I found the roots of the grasses had extended just as low as I had ploughed, and that, to all appearance, the soil was of uniform quality to the depth of six inches. This state of things pleased me so well that I determined to plough still deeper; and the fields were accordingly broken up seven inches deep. It is true, the appearance of the surface of the inverted furrows was rather suspicious and forbidding; but I had hopes that the agents that had operated so kindly before would act favorably again. They did so; and the crops were satisfactorily increased. At the time for the next rotation, I found the grass-roots had penetrated and formed themselves into net-work just as low as I had ploughed. I had now become well satisfied that deep ploughing was better for me than shallow ploughing; and I have accordingly been slowly but constantly deepening the soil, until portions of the fields bear a furrow nine inches deep; and as many grass-roots will now be seen at this depth as were formerly seen at the depth of six inches. The crops are good; for their roots can now strike deep, and expand, and luxuriate, and gather up nourishment, in formerly forbidden boundaries.

I think it may be said, generally, that deep ploughing should be the rule, and shallow ploughing the exception. It is true, that some soils may never, under any circumstances, bear as deep a furrow as others; then, again, where the surface soil is by nature very thin, and the subsoil is very poor, the process of creating a fertile soil eight inches in depth is a work of time, pa'ience, and skill; and though it be the work of a lifetime, it may yet be a very profitable work. But the soil of by far a majority of our farms may be deepened an inch or so at a time, if accompanied by liberal manurings and good cultivation. In other words, a suitable range for the roots of our crops may be obtained in a few years. In no case, however, should the surface plough be plunged into a poor subsoil at hap-hazard.

As soon as I was ready to turn sod-furrows seven inches deep, my ploughs began to be troubled to carry themselves erect and do as good work as at six inches deep. At eight inches deep they did not do nice work, and at nine inches deep they could not work at all, until I added some contrivances of my own.

About a year ago, I called upon Messrs. RUGGLES, NOURSE, MASON &

Co., and upon stating the difficulties I had experienced with my ploughs, they remarked that there was quite a growing demand for ploughs for deep work; and they at once evinced a most commendable readiness to undertake such a series of experiments, regardless of expense, as should enable them to supply, in the best manner, this demand of an advancing agriculture. They made a plough that gave me satisfaction, for it could turn a furrow a foot deep, and it did not choke under the beam. The making and trial of this plough suggested further improvements, and these in turn led to others. The various experimental trials may be summarily stated as follows:—

1. To make a plough to turn furrows ten to twelve inches deep, and to turn them without choking under the beam.

2. To make a plough to turn deep furrows, requiring the least practicable width in proportion to the depth of furrow.

3. To make a plough to turn deep narrow furrows, and to turn them on so easy a line of transit as to prevent breaks in the furrow-slice.

4. To make a plough to turn deep narrow furrows on the easiest practicable twist, and to lighten the draught of the plough whenever it could be done without detriment to the best work.

5. To make a series of sizes of ploughs for turning flat furrows, seven, nine, and twelve inches deep, each plough proportionately combining the above specifications.

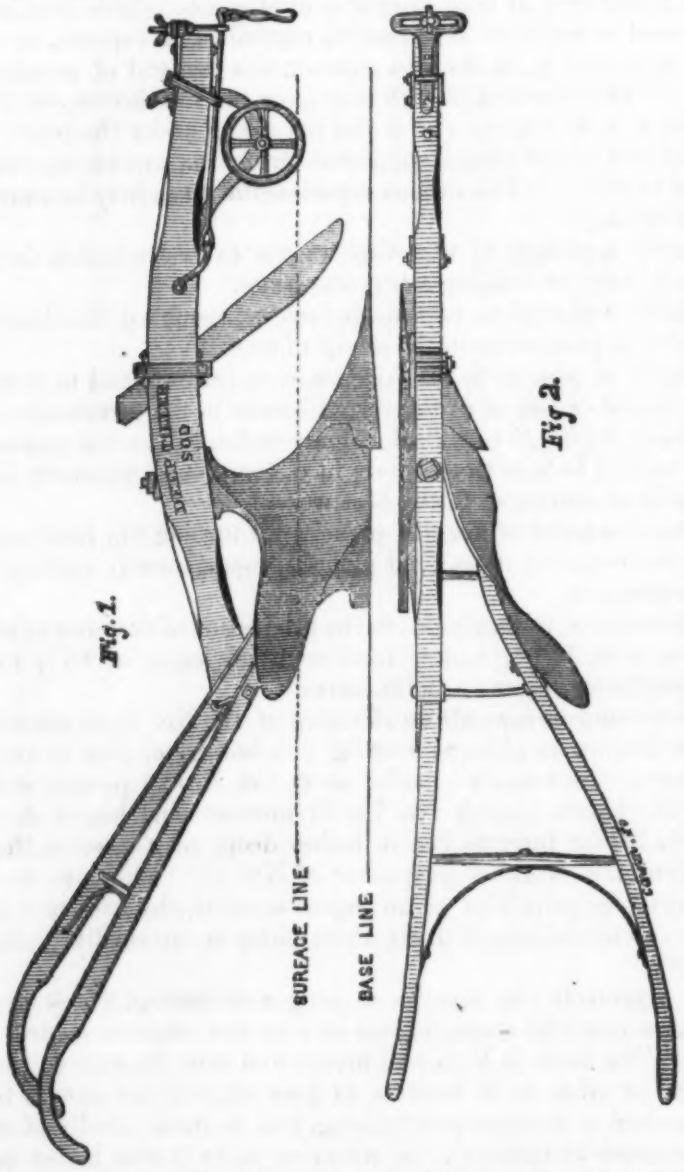
The experimental trials also led to the production of two sizes of ploughs for adhesive soils, laying lapped furrows at an angle of 45°; and two sizes of ploughs for turning stubble furrows.

Fig. 1 represents a furrow-side elevation of the No. 72, or smallest size of the new flat-furrow ploughs, and fig. 2, a horizontal plan of the same. In considering the remarks I offer upon the No. 72 plough, it will be borne in mind that plough No. 73, for furrows nine inches deep, and plough No. 74, for furrows twelve inches deep, each possess the same general form and working properties of No. 72. They are each constructed upon the principles of an ingenious scale, the lines of which, as applied to the mould-boards of the three ploughs, are relatively the same throughout.

Fig. 1 represents the handles as long and *raking*, which gives the ploughman a powerful leverage, and an easy and accurate control of the implement; the beam is high, and arches well over the coulter, to permit loose grass or other loose matters to pass off, and the plough to swim clear; the coulter is consequently long, and is made wholly of steel, to give it the requisite stiffness; the wheel or roller is nine inches in diameter, to prevent laboring and creaking on the axis, and it is set under the beam, experiments the past summer indicating that a wheel on the side of the beam gives the plough an unsteady movement; a wrench accompanies the plough, adapted to the adjustment of the coulter, roller, clevis, &c.; the draft rod is short, connecting with the beam forward of the coulter in order to preserve the space under the beam in that region entire; the quadrant or clevis attached to the end of the beam, through the bolt of which the draft-rod passes, is adapted to give the plough any desired *landing* or *earthing;* the mould-board is long, the line of transit over it for the furrow-slice is easy, giving the slice a long, easy, and equal curvature throughout.

Fig. 2 shows the inclination of the land-side, and the coulter has a corresponding inclination. Fig. 2 also shows the position of the beam

over the body of the plough. The share and lower parts of the mould-board are narrow, and the mould-board is high, to adapt the plough to



Ruggles, Nourse, Mason & Co.'s Furrow Plough, No. 72—Furrows 7 by 11 and 12 inches.

deep, narrow work. The share is long, with a raking cut, which gives it an easy entrance into the ground.

Fig. 3 represents pretty well the movement of a furrow-slice seven inches deep and eleven inches wide, over the mould-board of this plough, and its final position after leaving the plough. The easy transit and the equal flexure of the slice are noticeable. By means of the inclined land-side and coulter, the slice is cut off the land upon a bevel, which very much facilitates its dropping in snugly beside the previously turned slice. It will be observed that the width of cut made by the share is such as to leave a good hinge uncut, upon which the furrow holds its proper position at the bottom, while the top is describing a quarter of a circle to reach the perpendicular position, at which position the plough has ripped off the hinge. If the slice were cut entirely off by the share, it would be apt to

push off at the bottom so far as to fail of being turned over to its proper position,—in other words, a wider furrow would need to be taken to turn well.

Fig. 4 shows that, theoretically, a furrow cut straight from the land will shut in beside the previously turned furrow. The furrow-slice, c, d, e, f, is cut straight down at a, b, and rising on the corner c, as a pivot, it describes a quarter circle, b, d, and then changing to f, as a pivot, it describes another quarter circle, e, g, and shuts in snugly beside the previous furrow, g, h, i, k. But in practice it is difficult to make the furrows do so; they are very apt to ride on the corners, as represented by Fig. 5. With an inclined land-side, and a bevel-cut from the land, this practical difficulty is avoided.

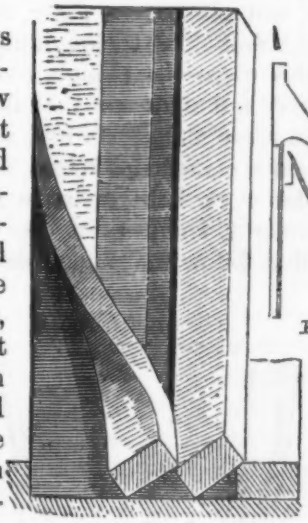


Fig. 3.

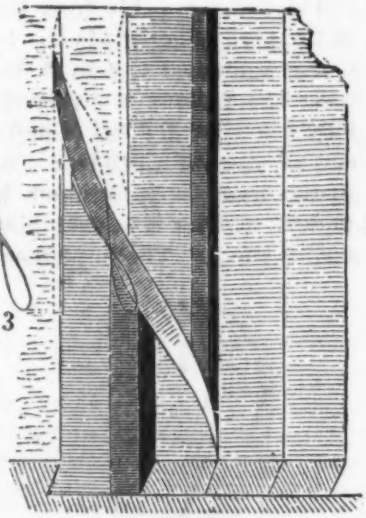


Fig. 5.

Fig. 4.

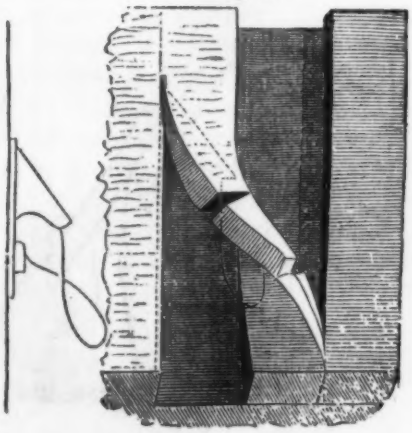


Fig. 6.

Fig. 6 represents the movement of the furrow-slice over an imperfect mould-board. It will be observed that the plough is too wide on the bottom to take a narrow furrow, and if the attempt is made to turn an eleven inch furrow, there is no hinge left for it to turn on. The mould-board is so short, and wings over so excessively, that the furrow-slice is cramped into an unnatural movement, and is badly broken. The plough is also too low every way for a seven-inch furrow, and is completely buried. We find in practice that such ploughs can only be kept erect in furrows seven inches deep, by constant, laborious exertion on the part of the ploughman; that they have a constant tendency to ride the furrow at the point where the mould-board wings over so much; that the heel of the land-side sole is lifted an inch or two from its proper level position in the furrow-channel, and that the plough inclines very much to run on the point of the share. Many of our American ploughs are too wide on the bottom for narrow furrows, too low in the mould-board for deep furrows, (or furrows seven inches deep,) too short for turning any furrows perfectly, and too unsteady in their movements generally.

It is a too common custom with our farmers in ploughing, to strive to

get over the greatest possible breadth of land in a day, without regard to the best work. The furrows are too shallow, and they are cut as wide as the plough can possibly turn them, and often even wider, the deficiency in the plough being made up by the foot of the ploughman, or else by the "cut and cover system;" and this gives the plough a very unsteady action; the furrows are very crooked and uneven; they do not match together at all well; the ploughman raves and scolds and whips; he assumes all sorts of attitudes; the team is chafed and fretted, and the whole matter is wrong. It is much harder work both for man and team to plough so, than it is to take nice, straight, uniform furrows. But this is not all the evil. The implements that follow the plough cannot do their

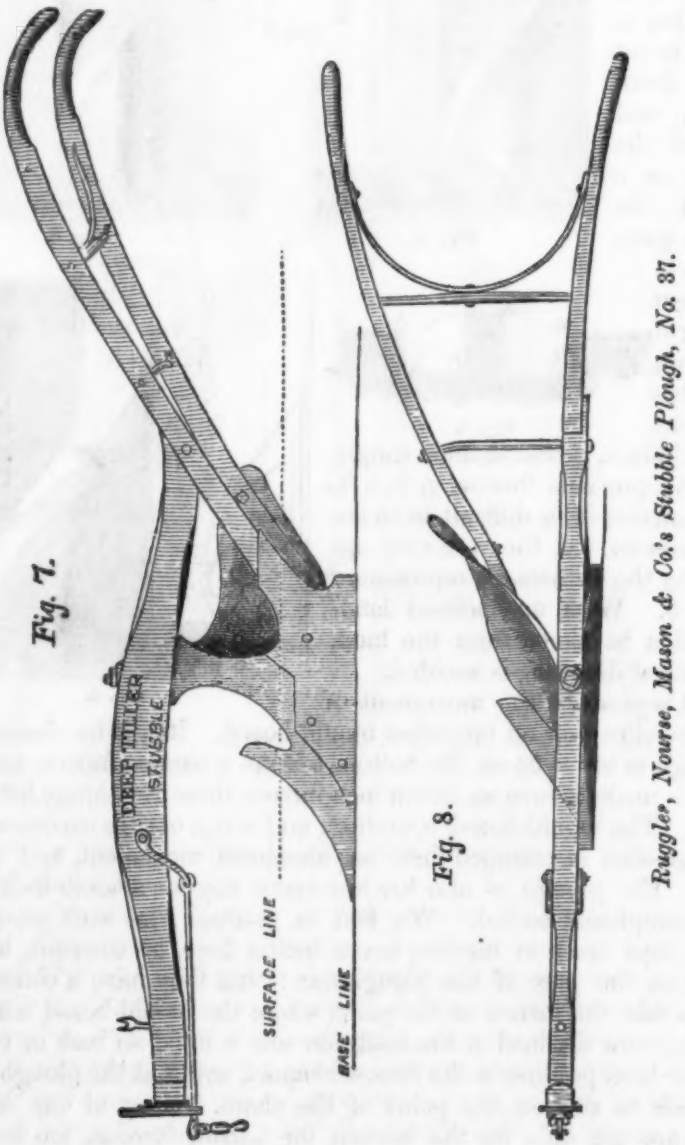


Fig. 7.

Fig. 8.

Ruggles, Nourse, Mason & Co.'s Stubble Plough, No. 37.

work half so effectively as they would do if the ploughing had been accurate and nice,—much less can they do what should have been done by the plough. There is no work in the whole round of husbandry that more demands the exercise of patience, precision and skill, than that of plough-

ing,—none, where, by the exercise of these qualities, the farmer receives a better reward. That old worthy, Jethro Tull, in his honest enthusiasm used to say, that if land were thoroughly pulverized, manure would not be needed. He stated the case pretty strongly; but it is not stating it too strongly to say, that however well land may be manured, the crops it is *capable* of producing will not be obtained, unless it is well pulverized—unless it is reduced to that state of tilth that permits a free circulation of air and moisture through it. Not the thick heavy clods, but rather the finely pulverized particles form the active portions of the soil. In whatever light, then, we view the matter, thorough pulverization should be the aim of the farmer. *Deep narrow* furrows are the best foundation for fine tilth. If the plough has failed to prepare this foundation in the best manner, no implement following in the cultivation can supply the deficiency.

Fig. 7 represents a land-side elevation, and Fig. 8 a plan of stubble plough, No. 37. There is a larger size, No. 38, adapted to deeper work than the plough here represented. The surface-line, Fig. 7, shows the position of this plough in a seven-inch furrow. The handles are of good length, though shorter than those of the No. 72 plough; the beam is high and arching; it is mounted with a short draft-rod and a dial-clevis, adapted to give the plough a wide range, both in *landing* and *earthing*. The perpendicular height from the base-line to the under side of the beam, immediately forward of the standard, is seventeen inches, which enables the plough to make its way among rank stubble, corn-stalks, &c., without choking. The fin-cutter is an excellent point in this plough. By making an easy, clean cut from the land, the furrow is not encumbered with clods of earth rolling down from the land-side, as they are apt to do where the furrow is torn from the land by the breast of the plough. The fin-cutter also lightens the draught of the plough. Fig. 8 shows the form of the mould-board, the position of the beam over it, and the position of the land-side.

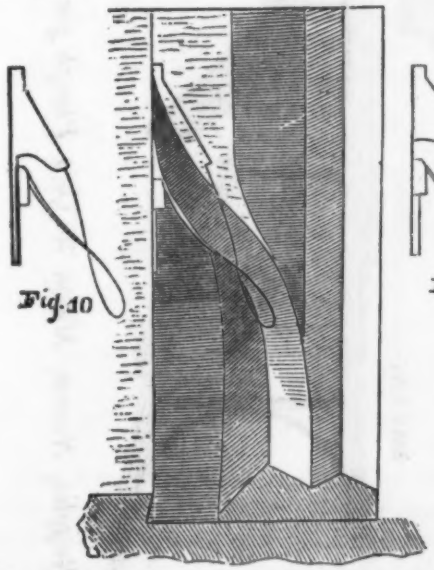


Fig. 10

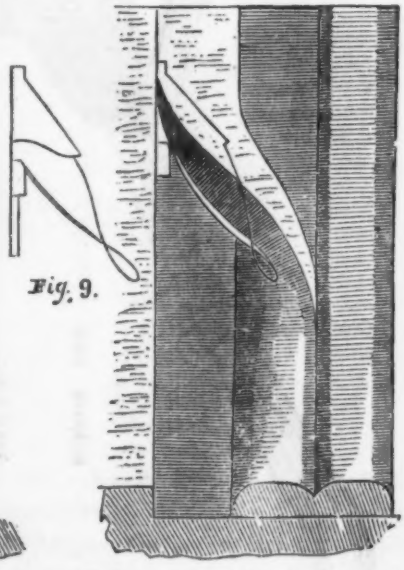
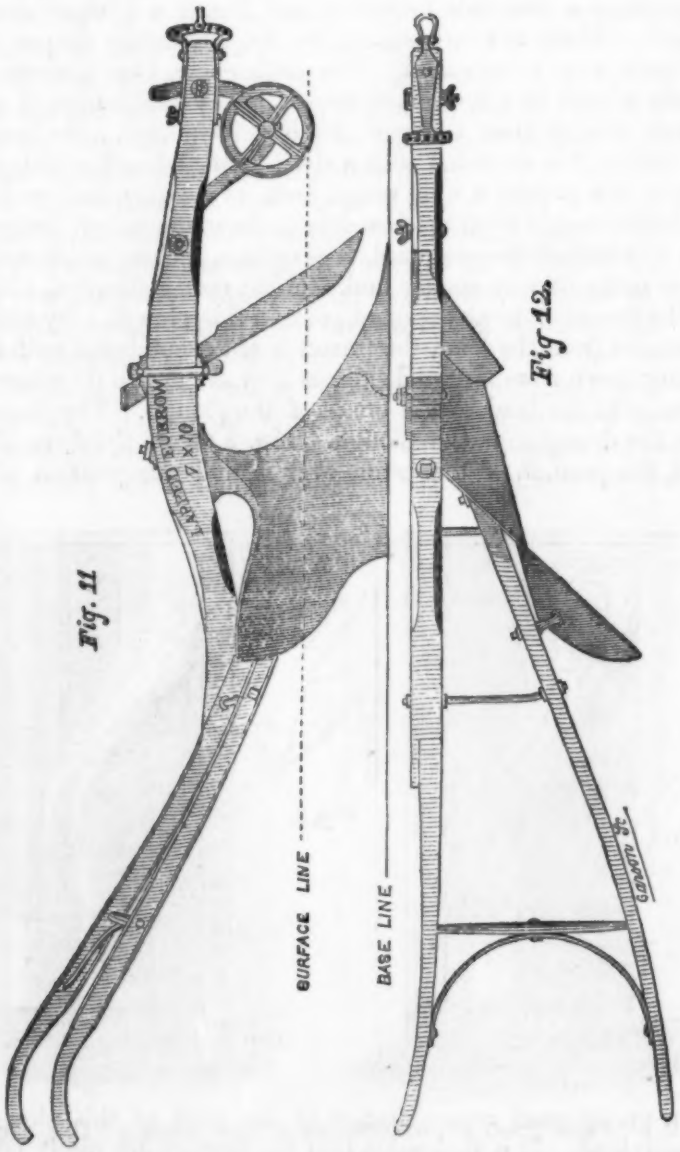


Fig. 9.

Fig. 9 is a pretty good representation of the work of this plough in stubble or old land. It is noticeable that the furrows are nicely laid for the reception of the seed-grain; that the furrow-slice is all taken up and forced over to an inverted position, and there it stays; and that the furrow-channel is entirely cleaned out for the reception of the next furrow. It

is impossible, however, to represent these practical matters exactly on paper; we can only represent them generally.

Fig. 10 represents the work of an approved sward plough, in stubble furrrows. It is not broad and full enough at the heel to clean out the furrow-channel. Then, too, after the furrow-slice has reached the perpendicular position, there is not force enough in the mould-board to compel the slice to go over to its proper place, and as there is not cohesion enough in the slice to hold it together, a portion rolls one way, and a portion the other. The centre of the furrow on top is therefore the highest, the furrow-channel is half filled up, and the work generally will not compare with that done by the stubble plough No. 37. The stubble plough No. 37 would not make nice work in sward furrows; it would break them too much.



Ruggles, Nourse, Mason & Co.'s Plough for Lapped Furrows—Furrows 7 by 10.

Fig. 11 represents an elevation, and Fig. 12 a plan of the new sward plough for moist adhesive soils. There is another size, for furrows nine

inches deep, of the same general form and proportions with the one here represented. The handles, Fig. 11, are long and raking, the beam is high, giving a space of seventeen inches forward of the coulter, and the plough is mounted with a Scotch clevis, the adjustment for *earthing* being represented in Fig. 11, and that for *landing* in Fig. 12. The general outline of the mould-board is very well represented in Fig. 12. The share is narrow, the wedge-power great, and the back part of the mould-board is adapted to place the furrow-slice exactly at an angle of 45° before leaving it. The land-side is perpendicular, and the coulter stands in a range with it.

In considering the form and proportions of a plough best adapted to the working of stiff heavy soils, Messrs. R., N., M. & Co. have thought that plough the best that will cut a perfectly rectangular furrow, whose depth is to its width as two is to three, and lay it at an angle of 45°. The ploughs for stiff lands that they now offer the public, are adapted to work as above specified. They combine the best working properties of the celebrated Scotch plough invented by Small, with the lightness and cheapness of the American plough. The lines of the scale from which these mould-boards are fashioned, give the mould-boards a slight convexity of surface, which is considered an advantage in the working of tenacious, unyielding soils; but the lines may be varied to straight lines for medium soils, or to concave lines for light sandy soils. The line of transit for the upper edge of the furrow-slice is adapted to the delivery of the slice with an unbroken crest. The mould-board presents a uniform resistance to the furrow-slice, and will brighten uniformly over the entire surface, however tenacious the soil may be.

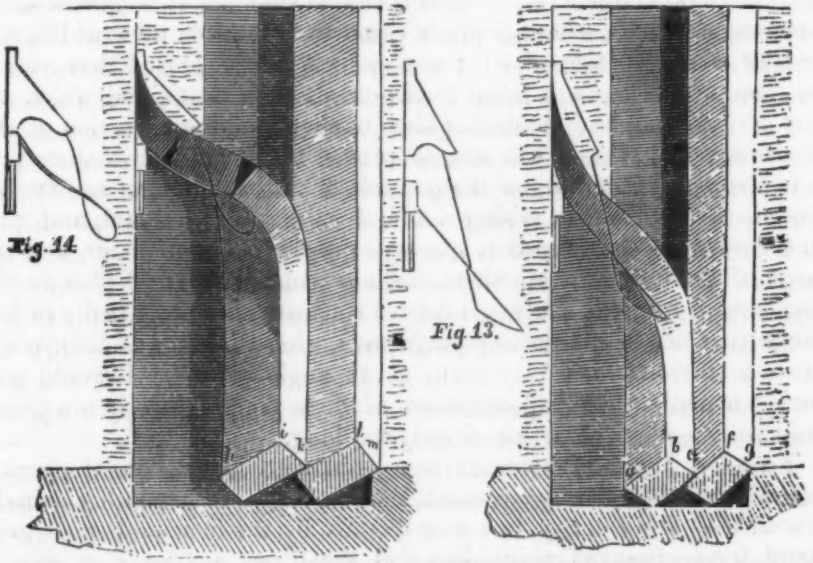


Fig. 13 represents the action of this plough in furrows seven inches deep by ten inches wide. The plough enters the ground very easily; a good hinge is preserved upon which to raise the furrow-slice to its perpendicular position; the back part of the mould-board lays the slice at an angle of 45° before leaving it, and the two exposed faces of the slice are of equal breadth,—namely, seven inches.

Fig. 14 represents the action of a plough unadapted to laying proper lapped furrows. The plough is so wide upon the bottom as to require a

width of furrow-slice of at least twelve inches, and yet it cannot go more than seven inches deep,—indeed it can hardly do that, without crowding over to the left or land badly, and it cramps and breaks the slice very much. But the slices are of unequal proportions. The width is too much for the depth, and, consequently, so flat a surface is formed, that if the furrows are to lie exposed for some time to the weather, and if the soil be a stiff adhesive clay, it will run together and bake so much as to render the harrow quite inoperative, and but a shallow seed-bed will be raised. The spaces underneath the furrows are wide and low, and they will be apt to fill with soil, which will prevent a proper circulation of air, and a free passage of superfluous moisture, and the surface will be apt to be wet and heavy.

The triangles, a b c, e f g, Fig. 13, are of equal sides, and the angles, b, f, are angles of 45°. The triangles h i k, k l m, Fig. 14, are of unequal sides, and the angles, i, k, are angles of only 36°. If we suppose a series of *sections* of these 7 by 10 and 7 by 12 furrow-slices, each extended to ten rods, for instance, in width, and that they are one inch thick, we shall find, upon a calculation of the aggregate exposed surface of each, that the furrow sections, 7 by 10, of equal faces, have exposed 2,791 inches of surface to the air, while the sections, 7 by 12, of unequal faces, have exposed but 2,722 inches; and any one who chooses to extend the calculation and comparison to an acre of ground, will find the balance to be very much in favor of the slices represented in Fig. 13. A like comparison of rectangular furrow-slices, whose depth is to their width as two to three, and which are laid at an inclination of 45°, with furrow-slices of any other form or proportions that are practicable to be laid, will be found to result in favor of those first named; indeed it can be shown that no furrow-slices but rectangular ones, whose depth is equal to two-thirds their width, *can be laid at an inclination of* 45°; and since it can be proved that rectangular ones, whose depth is equal to two-thirds their width, and which are laid at 45°, present the greatest surface to the ameliorating action of the atmosphere; and since it can also be proved that such furrow-slices present in their projecting angles the greatest cubical contents of soil for the harrow to operate on, in raising a fine, deep tilth, or seed-bed, and that such furrow-slices have the best spaces for the circulation of air, and the passage of water, underneath them, we may conclude that all ploughs, for laying lapped furrows in heavy adhesive soils, are absolutely faulty in just so far as they fail to cut rectangular furrows, whose depth is to their width as two to three, and to lay them at an angle of 45°. I would give unerring mathematical demonstration of these points, were it not that I should be extending an article already too long.

I intended, Messrs. Editors, to have said something about the importance of each radical improvement in the plough, in increasing actually the wealth of the country, not only directly by the increased crops to be derived from improved ploughing, and the direct saving of expense in doing the work, (a good plough saving time and labor,) but, indirectly, by exciting in the farmer's mind a new degree of pride and ambition to farm it better every way. But my article is already too long, and I forbear.

F. Holbrook.

Brattleboro', January 29, 1851.

REMARKS ON THE BEST MODE OF PRESERVING GRAIN,

PARTICULARLY THE CEREALS.

TRANSLATED FROM THE FRENCH, BY JAMES BRYAN, M.D.,

Professor of Institutes of Medicine in Philadelphia College of Medicine.

In the September number of the *Comptes Rendus*, we find an interesting extract of a lecture on the best mode of preserving grains, by Léon Dufour.

Mr. Dufour is well known in Europe as a very acute observer of the habits and histories of insects, as well as a scientific Agriculturist. "The reading," he says, "of an article by M.M. Bobiére and Cartier, on the means of preserving grain, inserted in the *Compte Rendu* of the Academy of the 12th of August, 1850, has reminded me that in 1841 I addressed a memoir on this subject to the Central Society of Agriculture, of which I am corresponding member.

"The method which I indicated to preserve grain from the charancon, (the weevil,) the papillon, (the fly?) and other destructive insects, is founded on reason and experience. The secret consists in placing the grain in conditions unfavorable to the production and development of the insect without injuring the grain. Now air, light, heat, and moisture are doubtless influences favorable to all germination, both animal and vegetable. Place the grains beyond the influences of those agents, and they may be preserved for ever. It is on this principle that the silos or granaries of the Arabs are conducted, and the *trostres* or tours of the Mexicans, in which millions of bushels of grain remain fresh and unchanged for indefinite periods. There is but one upper aperture, and one lateral one, through which the grain is introduced and taken out, both of which may be hermetically sealed.

"Before," says he, "stating the simple and economical plan which an experience of fifteen years has taught me to be the best, I will say a few words on the origin of my practice. I often found that grain garnered into one building, chiefly for the use of the farm, became affected with the fly (Papillon ou Alucite) in my granary at all seasons, while that of the laborer, placed in boxes (bahuts) or hogsheads, placed in the most obscure parts of their houses, were perfectly preserved. This hint was not lost upon me or others.

"I resolved, therefore, to place, immediately after the harvest, my grains well dried (but without artificial heat) in immense casks, (tons,) bought at a low price from the grocers or tobacco merchants. I staved in one end, and covered it with a movable covering, retained in its place by a large stone.

"These hogsheads, or tierces, containing from six to seven hectolitres of grain, are placed on one end in rows along the wall, in the darkest part of the granary, keeping the window-shutters always well closed. It is found that by this process twice as much grain may be placed without inconvenience in the same granary. I may here mention the testimony of Victor Rendu, Inspector of Agriculture, who has seen and approves of my mode of putting away grain. I know some large farmers of our country who have constructed, on the same principle, large receptacles of wood, which will contain more than sixty hectolitres.

"I repeat, that after fifteen years' experience in this process, I have not only found no insect in my grain, but what is of more importance, the depredations of rats and birds are avoided, as well as dust and all sorts of waste. The grain acquires no odor, there is no loss, and it preserves its purity for panification or germination. Indeed the merchants prefer it to all other grains.

"It would be easy to adopt this plan for large quantities in cities, by making with sheet-iron or zinc large receptacles, to hold forty to sixty hectolitres, and placing them in the above-named conditions. We do not here speak of the modifications necessary to be adopted for the extension of our plan to so great an extent. I have thought that some hints might be taken from the above by our farmers and others who deal in grains, in reference to their preservation. The depredations spoken of are not uncommon, as I well know, among farmers, especially where no care is taken to exclude the light and moisture. A barn or granary should of course be built in a dry place, with a basement below the surface of the ground, where the varieties of temperature of the external air would not be felt. In this basement, provided it be perfectly dry, may grains generally be kept."

DAIRY HUSBANDRY—CHEESE-MAKING.

ADAPTED TO A LARGE PORTION OF MARYLAND, VIRGINIA, TENNESSEE, KENTUCKY, GEORGIA, AND THE CAROLINAS.

Our readers will bear witness that this journal has not been inattentive to this interesting branch of rural industry, which, not less than any other, must languish or extend itself and prosper in proportion as *others* spring up and flourish within its reach. But why is it that it has not gotten fast hold, and thriven throughout the upland and mountain regions of Maryland, Virginia, Georgia, Kentucky, Tennessee, and the Carolinas—a vast expanse of country to which *dairy husbandry* is so eminently adapted, abounding as those regions do in perennial pastures, in cool and copious fountains of the purest water, with a climate peculiarly adapted to this business—why is it that, throughout the region referred to, the production of butter and cheese should go so little, if at all, beyond the local demand? Is it not because they have advocated a policy which forbids them to fill their mountains and mountain valleys, their coal-pits and their iron-mines, and sites for various manufactures, with tens of thousands of artisans and operatives, who ought to be there employed in working up their coal, and iron, and timber, and wool, and flax, and leather; and while doing so, make a market on the spot for their beef and mutton, and butter and cheese?

Yes, this it is—this cry of "free trade" with the mother—no—step-mother country, that has kept this vast and magnificent region almost as sparsely settled and as desolate as when inhabited alone by forlorn savages, blind to the use of all the rich and various materials bestowed on it by Providence, for the support of a numerous and civilized people. As the native Indian pursued his game over beds of iron and fields of coal, and through trackless forests of timber and evergreen prairies, unconscious of their value, so do these fertile resources of population and wealth re-

main almost totally unused, monuments at once of the bounty of Providence and of man's ingratitude. Could any man believe that, with resources so unbounded as we possess, for rearing wool and manufacturing woollens, we should import annually from England, of woollens alone, some ten or twelve millions of dollars? We hope the time will come when posterity will be slow to credit it.

There are signs, however, that the public mind of these old States is beginning to see the importance of so diversifying industry and concentrating population, as to bring all our own resources into play. When that consummation so devoutly to be wished shall have been realized, then will the capabilities of the great region we have described be put to the test; then will its people begin to understand their unequalled adaptation to the production of *coal and iron, cloths and leather, beef and mutton, butter and cheese.* In the mean time, the extending circulation of this journal in the butter and cheese districts of Pennsylvania and New-York is sufficient to warrant a fair share of attention to the subject, and prompts us to give the following extracts from a recent lecture in England on cheese-making, selecting only such parts as appear to be adapted to practical use in our own country. It may be as well to premise that these observations are made, not by a scientific, but by a plain practical man of much experience.

Before he treats of the dairy, he remarks on the importance of keeping the cows warm, a thing which we know is grossly neglected throughout a large portion of the United States. On this subject he says:—

Warmth has a very great influence upon the secretions of milk; and even a walk out of the shed for the purpose of drinking, tends very materially to lessen the quantity given by a cow in the cold season of the year. Every cow-shed, for milking beasts especially, should have a supply of water, so that the animals may help themselves without exposure to the influences of wet weather or a lower temperature. I must beg to inform you, that this is no fancied or theoretical view, but is actually the fact; and that a great decrease in the quantity of milk delivered in our dairy was traced to such simple cause. Some one, for mischief, had sent down the main water-pipe, that supplied the shed, a small bundle of straw, which lodged in one of the branches and completely cut off the flow on that side. Sixteen cows were then in milk, and half (in consequence of the water being cut off from them) were turned out twice a day to the pit, not a hundred yards off, to drink, and were immediately brought back again. A complaint was made to the man in charge of the cows that the milk was falling off considerably in quantity! and, further inquiry being instituted, it was ascertained from the milker that the loss lay upon the eight cows turned out to water, for every one had abated in her milk. This accident was at the time very satisfactory to myself, as it proved that an outlay which had been made upon theoretic views was really useful, and had not in practice been thrown away. To make you fully assured that the abatement in the milk of these eight cows was caused by their simple exposure to the unfavorable influences of a lower temperature and different atmosphere, I must tell you that, with the removal of the stoppage in the pipe, and the consequent flow of water permitting the cows again to drink in the warm shed, they gradually recovered their former quantity of milk.

So much for the influence of warmth upon the secretion of milk.

He next remarks upon the importance of regularity in feeding, and upon milking, as follows:—

But if cattle are to receive the principal part of their food in sheds, very great attention must be given to them. They must have change and variety in their food, and they must be regularly served with it. A man in my employ, who attended to a lot of thirty-three milking beasts, went to the funeral of one of his relations; I left home the same day on business, giving these cows in charge to a young man

who lived with me at that time, under his promise that they should have plenty to eat. I believe he was afraid of the rain which fell on that day, and therefore neglected his charge; for on my return at night I heard the cows in the shed calling loudly for something to eat. The next morning there was a falling off of milk to the extent of nine gallons, at night eleven, and the following morning thirteen. This was late in the year; but the cows, for that season, never recovered the quantity of milk which they had previously given.

I have mentioned this fact to show how very dependent the secretion of milk is upon the supply of food, and how much the success of dairy operations depends upon the attention bestowed upon the animals which are to produce the milk. Kindness, gentleness, and quietness, are requisites with cleanliness, in all engaged in a cow-shed; and all bad tempers, quarrelsome dispositions, and noisy, boisterous persons, should never be allowed to set their foot therein!

Ere we leave the shed for the dairy, I have a few words to say upon the time of milking. The usual method pursued in this county is to milk twice a day—morning and evening. In Lincolnshire they will milk thrice, and in Scotland sometimes five times in the day. Last season I adopted the plan of milking thrice in one shed only; this season we are milking three times at both; you will therefore infer that I have proved it to answer. I will also tell you that, in May last, I mentioned this plan to a gentleman who supplies his milk to Leicester. He tried it upon a lot of twenty-nine cows, and he told me that on the third day from the commencement of his trial, these cows gave him in the day fifteen gallons more milk. I met this gentleman on Saturday last, and he said he should adopt this plan again. In addition to his former opinion of its utility, he gave me this further information: that his cows had formerly been greatly troubled with sore bags, but after the thrice-a-day milking commenced he had no more of them. We have all seen the udders of the cows greatly distended with milk, and it is no wonder that the animal feels pain, and that local inflammation ensues.

Objections may be raised to this third milking—some will say the cows require more keep. I answer, the cows are machines to convert grass into cheese, and if I can make each cow do more work, I save the outlay of capital in purchasing an unnecessary number of beasts. Some will say it must be injurious to the animal. The lot milked last year thrice a day on this farm are equal in health and condition to the lot milked twice, and are now open to inspection.

Before I quite close this portion of my subject, I must observe that milking qualifications in an animal are equally capable of transmission by descent, with the distinctive marks of the various breeds, or with their propensities to fatten; and if they are capable of transmission, they are also equally capable of improvement by cultivation. It behoves, then, the farmer who rears the supply of cows for his own dairy, to be particular in looking for a good line of descent in the milking qualifications of all animals introduced into his herd. It behoves him to see that these qualifications are maintained in full power to each individual, and that they be further improved in his hands by stimulating foods and regularity of milking—by kindness, warmth, and general attention to their health and habits. In short, a dairy farmer should not only care for his herd, that they give milk at the present moment in the greatest abundance, but that they have their milking powers kept to the utmost stretch, as the means of producing fine milkers in generations yet to come. Perhaps I ought not to omit some practical notice of the secretion of milk. It may be styled a sympathetic operation, and the supply, in a great measure, will be regulated by the demand. This is an all-wise provision of Nature for the necessities of the young of animals; and we only follow the teaching of Nature a little more closely by milking oftener than twice a day. To use the words of our man who looks after a part of the cows, "The milk does not flow to the hands (that is, the udder is not so distended) now as it was in twice-a day milking; nevertheless, after milking a minute the supply will come." To illustrate more particularly the sympathetic affection between the action of milking and the consequent flow of milk, I quote this man a little further. He was speaking of a particular cow, and said she had no milk in her bag when he commenced milking; but it came by milking a short time, and in such quantity, that he has often wondered where she had previously put it. This man is not a physiologist or theorist: he spoke only matter of fact.

THE DAIRY.

I will not attempt a minute and chemical account of the process by which the milk we delivered from the cow-shed is here to be converted into cheese,

but will content myself with practical observations upon the management of the dairy. The object of all is to produce the greatest money-profit ; and, according to my ideas, this is best achieved by making the best quality of cheese. At Leicester fair, last autumn, there was a difference in the value of dairies to the amount of 18*s.* per cwt., which, at 3 cwt. per cow, will give £2 14*s.* per cow., or £54 in a dairy of 20 cows. Now, when it is considered that a little extra care and attention form perhaps the chief item in the higher prices, it is surely worthy of consideration whether we can in any way amend our plans. There is also another point upon which I would suggest a question. Can we, by thought and contrivance, lessen the labor of cheese-making operations? I determined, if possible, to do with less labor in the manual part of cheese-making. I tried several schemes—some rather expensive—some of them failures ; while some were attended with success.

The object I had in view was to secure the whole of the curds, and also of the butter in the cheese. To effect this, it is necessary to avoid breaking the curd by the hand, either in the cheese-pan or the vat ; for by much breaking and crushing, a large quantity of minute particles of curd and butter are separated from the mass, and are carried off by the whey, to the loss, both in weight and quality, of the cheese.

To remove the whey from the curd with the least disturbance, we introduced the use of the syphon ; and to save lading out the remainder of the whey and curd from the cheese-pan into the vat, we adopted the plan of swinging the pans on pivots fixed to their centres. The cheese-vat is merely placed upon a lead, the pan is turned upon its pivots, and its contents are delivered at once into the vat ; whilst the whey which had not been entirely removed by the syphon escapes into the vessel, where it is to be skimmed for the butter it yet contains. On reference to our last year's account, I find ten ounces per cow was the weekly average of the butter removed by this method from the cheese.

I will now notice a few points that have become known to us in our experiments in cheese-making, after which, and the discussion which I hope will follow, I shall have pleasure in showing you the dairy, where the arrangements in use may speak for themselves.

One of the greatest desiderata now is a means of testing properly and accurately the strength of the rennet. So far as my knowledge extends, this can only be arrived at by actual trial. The common method is to make a large quantity ; and by ascertaining the actual strength upon a cheese, there is some little guide obtained for future operations, so long, at least, as this manufacture of rennet will last. But it is of very great importance that a better guide for the dairymaid's use should be laid down ; for all excess of rennet, after the production of curd—that is, all that is not required to convert the milk into curd—will remain in the cheese to promote early decomposition, and is often the cause of great pecuniary loss.

The process of cheese-making depends upon chemical causes and influences, which in themselves are as unvarying as other natural laws. To procure the conversion of milk into curd, a certain degree of temperature must be obtained ; and we have observed that 82-84 deg. (about 12 deg. lower than when it comes from the cow) is the proper heat to be observed in the summer season for putting the milk together, and about two degrees higher in cold weather, to allow for the greater decrease of heat by surfaces coming into contact with a cooler atmosphere. A thermometer is now a necessary appendage to the cheese-pan. I may as well add in this place that 52½ degs. is the proper temperature for conversion of milk into butter, and that two or three days' churning of cream (which we sometimes hear of) in winter before butter is collected, is solely to be attributed to its low temperature.

But although 82 to 84 degs. is the proper heat for putting the cheese together—producing, according to present experience, the greatest quantity of curd—still it is not then sufficiently high in temperature to allow its complete separation from the whey. To facilitate this separation, it is found desirable to run off a portion of the whey, which must then be made hot enough to raise the whole mass in the cheese-pan to 90 degs. This in a few minutes will cause the curd to fall ; and the whey must then be drawn off as quickly as possible, for, if allowed to remain too long, it has a tendency to toughen the curd. Our practice is then to put the milk together at 82 to 86 degs., according to the weather. We let it stand an hour and a half before breaking in the pan ; this is half an hour longer than generally allowed ; but as we wish to use the smallest quantity of ren-

net in converting the milk into curd, we find it necessary to give a longer time than ordinarily is allowed for its full conversion. After breaking and settling a few minutes, we apply a syphon to run off the whey, and for this reason—it disturbs and breaks the curd far less than is done by lading. From putting the cheese and rennet together, till the curd is removed from the pan into the vat, the time occupied is about two hours and a half.

I have seen, both in Gloucestershire and Leceistershire, a mill employed in grinding up the curd; and I notice often in our neighborhood, also, that several break up by hand, to what I consider the injury of the cheese. I see, likewise, round us, two, three, or four persons about a cheese-vat, crushing with their hands; and I have been told that it is generally thought right to continue such process for an hour at least, before the cheese goes to press. Now we dispense with a great deal of this (to us) unnecessary attention. The curd goes from our cheese-pan directly under the press without any hand-crushing whatever. There it remains ten or fifteen minutes; the edges of the curd are then pared off, and put into the middle of the cheese, which is pierced with a skewer on both sides, and returned to the press. In a quarter of an hour it is pierced again—the edges are cut off on the opposite side—and again it is put under press; in half an hour the cheese is pierced the third time - put into a dry cloth—and the press is now allowed to complete the work. I should explain that the press used in this process is a lever press, working up to 23 cwt., and the weight brought to bear upon it at first is small, but is increased as the cheese advances in solidity. From the delivery of the curd into the vat, till it is fixed for final pressure in the press, about two hours are taken up; but for full half that time the person employed in attending upon the making may be occupied in the other work belonging to the dairy. And it must be borne in mind, that with the separation of the liquid from the solid matter, our trouble with regard to the former is ended, as there needs no carrying to the whey lead for skimming, and no further carriage from thence to the cistern. You will observe, in the dairy, the whey goes at once into the leads, and from them is removed by taking up a plug, which allows it to escape to the cistern.

I need not go into the minute details of brining, salting, &c., as every one conversant with cheese-making must be well acquainted with them; but I will observe that many points which appear to be of little consequence to a casual observer will make a great difference to the economy or the profit of cheese-making.

It is the object of all of us—at least, it ought to be so—to make a good quality of cheese; and this is undoubtedly best achieved by making up at each meal immediately; every gallon of milk, so converted, will produce, at the lowest, sixteen ounces of curd; and there must be some mismanagement if it ever falls below that quantity. At the autumnal season the relative value of the milk for cheese-making is greatly increased, and will sometimes yield one-eighth more of curd to the gallon. With the above object (quality of cheese) we often combine also those of size and family convenience; and for that purpose milk will sometimes be kept till the next meal. In warm weather this keeping of milk is attended with some care, for unless the temperature is brought below 56 degs., milk will acquire an acidity, and the result will be a sour-milk cheese. This cheese will be of less value per lb.; but this will not be the whole of the loss; for experience has told us that the same measure of milk which has yielded 56 lbs. of curd in a sweet state, has, by a slight change, yielded only 45 lbs. To keep milk sweet over the meal it is necessary to cool it by water; 52½ degs. is the temperature of water, which, being brought in contact with the vessel containing milk, and occasionally changed, will secure the milk from going sour. We have accomplished this object in our dairy by passing through it a running stream; by setting tins of milk in a trough through which this stream passes, we can keep the whole of Sunday's milk sweet for Monday's use. There is also another advantage derived from this plan: by cooling the milk in deep tins, and occasionally stirring it, the cream is prevented from rising to the surface, and does not require the trouble of skimming and remixing with the milk, which reunion by artificial means is never thoroughly accomplished.

Among other discoveries from my various trials, I have found that tin vessels will not answer for cheese-pans. I thought to save expense by using such, but, after the first season, was obliged to lay them aside; for the chemical affinity between tin and curd is so great, that we could not separate it wholly by the breaker, and slip-curd, consequently, was found in almost every cheese.

I will close my remarks upon the dairy in Professor Way's words:—"Scrupulous attention to cleanliness is another essential of dairy management—the scalding,

cleansing, and airing of the dairy-vessels being of the greatest importance. No stable and drain should be near it, and the cheese itself, were it possible, should be separated from it."

CHEESE ROOM.

A few remarks upon the cheese room ere I close my subject. Too often this is inconveniently situated under the slates of the house. In the summer it is too hot, in the winter it is too cold. The great heat of summer may be lessened by hanging up wet blankets at the window; and I have just heard that, by allowing a few worsted threads to drop from these into a bucket of water, the blankets will be kept wet by the force of capillary attraction. In the winter the external air must be excluded as much as possible, and artificial heating by steam or other means must be employed. I recommend, where it can be conveniently done, that hot water should be used: the heat is more generally diffused, and the air is not rendered so dry as to crack the cheese.

With the utmost care employed, some of the cheeses will be found to crack. These should be filled up, and a little paper pasted over to prevent the attack of flies. I can only recommend as general rules, that you should allow no extrêmes of heat or cold, moisture or drought, to affect the cheeses whilst in your possession, and exchange them for money as soon as you can effect a sale.

IRRIGATION.

Translated principally from the "Journal d'Agriculture pratique."

BY F. G. SKINNER.

That the yield of a crop is generally in proportion to the quantity of manure applied to it, and that profit does not depend so much upon extent of surface cultivated as upon manure and good tillage, are agricultural axioms, the natural deduction from which is, that a small, well-cultivated, and heavily manured farm, will return a greater net revenue than a much larger one, with the same expenditure in labor and manure spread over a larger surface; and of this fact, we are surrounded by proofs on every side. In all the older States, under an improved system of tillage and manuring, we find mere fractions of what were once large estates, yielding not only greater proportional profits, but actually larger aggregate returns, than did the original estates of four or five times the extent of surface.

Manure is the chief source of agricultural prosperity; by its means bad land is converted into good, and the most barren wastes compelled to yield the richest products. Of all known manures, none are of such value and importance as those from the stable and cattle-yard; for these are adapted to a greater number of locations and variety of soils, and to all plants, and modes of cultivation. True, substances are frequently used as fertilizers, much more energetic than ordinary farm-yard manure; but it is only to *supply a deficiency in the latter, or to increase its action.* These fertilizers are not to be had in sufficient quantity, nor is their transportation so easy, as to dispense with the necessity for stable manure, without which in most cases agriculture would become an unprofitable pursuit.

As the productiveness of a farm or crop depends less upon the extent cultivated than upon the mode of cultivation and the amount of manure applied, so does the quantity of manure made depend less upon the number of animals fed than upon the amount and quality of food consumed; and in relation to manure, cattle are only to be looked upon as

machines for the conversion of forage and other food into that substance, a part of the forage being assimilated by the animals for their sustenance, and the remainder voided in the form of manure, the value of which mainly depends upon the richness of the food; for it is well known that the droppings of a lean, ill-fed beast are inferior in quantity and quality to those from a fat one. It may, therefore, be assumed as a maxim, that the prosperity of a farm depends chiefly upon the amount of food consumed upon it; and in general, the amount of hay made upon an estate is a safe indication of its condition, and an increasing production of forage is a sure sign of agricultural improvement.

As a means of producing food for stock, *irrigation*, whenever tried, takes precedence of every other, and the chief reason is, that instead of *consuming, it produces manure.*

The process of irrigation has invariably, wherever carried out, proved of almost incalculable value, and there are probably few countries that would derive greater benefits from its general introduction than the United States. Indeed, there are large portions of our recently acquired territories in New-Mexico and California, that must ever remain barren wastes without it.

A bounteous Providence, in giving water to the cultivator, furnished him the means of increasing his crops to an almost indefinite extent; for by means of irrigation, this simple element, poured out in most places in such abundant profusion, becomes the "kindling instrument of life and energy to the vegetable world." Water is indispensable to the perfect development of plants, for its elements enter into the composition of all of them. Not only does it enter chemically into their organization, but it also holds in solution foreign matter which serves them as manure, and which is either deposited or rendered of easy assimilation: thus from 75 to 95 per cent. of nearly all green plants consists of this element. Almost all spring waters contain carbonic acid, and frequently sulphur, lime, and a variety of salts, a greater part, if not all of which, being decomposed and absorbed by the plants, contribute greatly to their development.*

Rivers, small streams, and most spring brooks carry with them minute particles of earth, which are deposited in the form of a rich mud or slime. Rain-water too, flowing over roads and fields, becomes charged with fer-

* The following analyses, by Professor Johnston, exhibit the composition of the waters of four different rivers:

	Ale.	Eye.	Riglaw	Wear.
Organic matter,	1.75	1.64	2.58	0.92
Potash in the state of sulphate,	1.68	0.80	0.72	1.50
Soda and chlorides,	.....	0.44	1.94	
Gypsum, (sulphate of lime,)	0.64	1.46	2.94	0.88
Carbonate of lime,	5.28	3.48	7.32	7.92
Carbonate of magnesia,	1.00	1.24	1.64	2.04
Chloride of magnesium,	1.82	0.80	1.25	.....
Oxide of iron,	0.56	0.48	0.60	0.56
Sulphuric acid,	1.44	0.98	1.80	0.96
Chlorine,	0.36	0.70	1.65	1.10
Silica,	0.24	0.08	0.32	1.20
	14.77	12.10	24.76	17.08

tilizing principles, which are carried into the rivers, and finally lost in the ocean, if they are not arrested in their course by the skill of the cultivator, and applied as manure to his fields. The soils thus swept away form a mass of which it is difficult to form a conception, and continual changes are being made upon the earth's surface by the constant but imperceptible action of water upon mountains and hills. It is calculated by Rinnel, that the hourly deposit of mud at the mouth of the Ganges amounts to 2,509,056,000 cubic feet, at the mouth of the Nile to 14,784,000, and at that of the Mississippi to 800,000. Few rivers, indeed, carry with them such enormous quantities of mud as the Ganges, the Nile, or the Mississippi, but all of them, nevertheless, sweep away to the ocean more or less of fertile soil of value to agriculture, and thus produce changes upon the surface of the globe, by which future generations may profit, it is true, but at the expense of our own. Mountains and hills are constantly washed by rains, all their fertile parts are carried off, and they finally become naked masses of barren rock if nature has not heaped upon them an inexhaustible supply of vegetable earth, or if the losses are not repaired or prevented by skilful management. Soils at the mouths of rivers, of recent formation, are the sources of malaria and other unhealthy emanations highly prejudicial to animal life. While nature by her vast combinations thus prepares fertile fields for generations to come, she does not forbid the exercise of man's ingenuity to compel the spendthrift waters to pay a passing tribute of fertility to his wasting fields. By covering the mountain slopes and hill-sides with grass, and turning aside the streams for its irrigation, agriculture may diminish a portion of the evil, and profit by that which it cannot prevent.

In northern climates, irrigation so far has only been applied to meadows, and but little, if it all, to cultivated or ploughed lands. At the south, under the burning zones of Asia, Africa, and America, water is essential to every species of cultivation. It is applied to the grains, to the vine, and indeed to every plant requiring a degree of moisture that cannot be derived from the atmosphere. Rice, the grain that probably contributes more than any other to the support of human life, and the most important product of southern climes, requires frequent and abundant irrigation; that its "foot should be in the water and its head in the sun," is an indispensable requisite to its profitable cultivation.

In warm climates, irrigation made itself felt as an absolute necessity by the most ancient nations, and stupendous works for the purpose were executed at a period now lost in the night of time. The best known to us are those alluded to in the books of Moses, and described by the profane writers.

From Upper Abyssinia, near the eastern coast of Africa, two chains of mountains descend parallel with the Red Sea, nearly to the Mediterranean; between these two chains flows the Nile. From its source to about midway its length, it is hemmed in by high mountains, then it opens upon a vast plain which constitutes the kingdom of Egypt. With a surface one third less than the State of Virginia, this kingdom supported in the time of Sesostris a population of 25,000,000, a standing army of 400,000 men, and was covered with superb structures and magnificent cities. It constituted the first and wealthiest kingdom of the earth; it was the sole emporium of corn to the surrounding nations; it was the birthplace of the sciences that civilized, and of the arts that adorned ancient Greece and Rome; and even now, modern nations are

contending for mere fragments of her glorious monuments, with which to embellish their cities: and yet all this wealth, grandeur, power, and civilization may be fairly attributed to irrigation—irrigation on such a scale as the world never saw before or since. The whole territory of Egypt was divided by immense levees and dykes into three great zones, and the waters of a great river were controlled, and managed, and used for agricultural purposes, as completely as if they had been those of a mere rivulet. Surrounded as Egypt is by naked and sterile mountains, and by the arid sands of the desert, (except upon the Mediterranean coast,) rain rarely falls there; the want of it is in a measure supplied by heavy dews, but still, without the annual overflow of the Nile, all vegetation would speedily wither away beneath a scorching sun. The river, unaided by artificial means, overflows a vast surface; but the ancient Egyptians doubled the extent of their arable lands by compelling the water to spread over a wider space. But time and barbarism have destroyed their works, the glory of Egypt is departed, and her habitable territory has shrunk to less than half its former dimensions. The Egyptians were not the only people who thus made water tributary to agriculture. In the now desolate regions surrounding the once proud cities of Nineveh and Babylon, the remains of aqueducts, tunnels, and canals yet exist, to overwhelm the wondering traveller with their stupendous proportions, and which prove that even the waters of the Tigris and the Euphrates were rendered obedient to human skill and industry. In China, where agricultural art has remained stationary for centuries, the earliest travellers, Marco Polo, Ruberquis, and others, marked the care with which water was turned to irrigation, and the skill evinced in its application.

From Egypt the art of irrigation passed into Greece, but it never reached there the perfection attained in so many other arts drawn from the same source; and the reason is obvious,—the young men of Greece were educated to public life, they cultivated the finer arts, and the cares of husbandry were abandoned to slaves. Nevertheless the worship of their gods, of fountains, and of rivers, and the ceremonies attached, prove that the irrigation of meadows and fields was one of the important operations of Grecian agriculture.

Persia, with her burning sky and sandy plains, owes the greater part of her fertility to the use of water, and in that kingdom the art of irrigation is duly appreciated. Laws are still in force there which existed long before the people of Greece grew to national importance, exempting from taxation for a certain number of years such lands as were most skilfully irrigated. From Greece civilization, the sciences and the arts passed into Italy, and with them the Romans acquired the art of irrigation, as is proved by the remains of canals and the testimony of the Roman writers on rural economy. The plains of the Milanese were enriched by the waters of the Po and the Adige, which were completely controlled by means of locks and dams, as is shown by an inscription still extant upon a marble tablet at the Roman gate of Milan.

The northern hordes of Goths and Vandals that overran the Roman empire, and who at a later period finally established themselves upon its ruins, though they remorselessly destroyed monuments and temples, spared the works dedicated to agriculture; the dams, sluices, and aqueducts were not only respected, but maintained in efficient repair; and at a

later period, when peace prevailed, additional irrigating canals were dug, which are still in existence.

The Saracenic domination, which in the eighth century extended itself with great rapidity around the shores of the Mediterranean, was signalized in Spain by the impulse it gave to agriculture. From the banks of the Oxus and the skilfully watered plains of Persia, Syria, and Babylonia, along the African desert, through the island of Sicily, to the Spanish peninsula, the indefatigable industry of the Saracens, and that of their ingenious successors, the Moors, manifested itself in the prosecution of every kind of agricultural labor. In Spain they carried it to a degree of perfection which has never been surpassed in Europe, never equalled perhaps, except in Holland and the Netherlands.

They had seen in the East and thoroughly understood the one grand necessity of southern agriculture. When it is said, and with truth, in such a climate as that of England, that drainage is the first great requisite of farming, it is only the expression of a truth which applies in the same sense to irrigation in all soils liable to drought. In England the superabundance of water, here its deficiency, is the great point for correction, anterior to every other improvement. The race of Spanish Arabs had the merit of extending this knowledge and the practice consequent upon it in Europe. By spacious reservoirs, canals, and aqueducts, they conveyed the great ELEMENT OF FERTILITY into remote districts, which had before been barren only for the want of it. Under their care and skill, the plants and vegetables of Asia and Africa for the first time grew side by side with the native products of Europe, and the sugar cane and the cotton plant laid the foundation for that great impulse to European art, which was destined at a later period to cause so great a change in the industry and commece of the world. Even to this day the traveller in Grenada and Valencia, amidst scenes of utter apathy and indolence, varied only by a chronic system of intestine dissension, worthier of a savage than a civilized nation, often meets the remains of a once magnificent system of irrigation, standing like monuments of the indefatigable labors of a race that has passed away, but carrying with them so lasting an attachment to Spain that, long after their final expulsion from Europe, they retained and handed down through many generations recorded titles of their estates, and even the very keys of their houses in the Spanish peninsula.* Hitherto the influence of Saracenic genius, though extending the whole length of the Mediterranean, on both its shores, had little opportunity or inducement to penetrate northward. Spain, their grand and final conquest and favorite settlement, and which had become a perfect model farm of southern agriculture, was too much separated on the only land side from the rest of western Europe, by the broad chain of the Pyrenees, to have produced any extended influence. Its position was altogether unfavorable to northern communication. What the Arab conquests, however, had failed to accomplish, the crusades providentially carried out. When the hosts of rude mail-clad warriors of the West, obedient to the call of the hermit-soldier, poured over the fruitful plains of the East, they witnessed a perfection in the agricultural art of which they had never dreamed before; and such of them as lived to return to their homes took with them the knowledge of irrigation, probably not the least valuable of the many benefits incidentally derived from those senseless expeditions.

* Foster's "Mahometanism Unveiled."

The science of hydraulics has participated in the progress made by all the branches of human knowledge. It is conjectured, that in the middle ages, irrigation and the construction of works connected with it were based upon practice and observation only; but now the lamp of science lights the way, and we may proceed boldly onward with entire certainty as to results. Upon many points of Europe new canals have been dug to enable agriculture to profit by the fertilizing effects of water, and the practice of irrigation, even in that (as compared with the United States) moist climate, is extending in every direction.

In this short exposition it may be remarked, that man from the earliest ages has been led, both by nature and necessity, to water his meadows and fields; that even the most barbarous conquerors felt not only a just appreciation of what had been done for irrigation, but became irrigators themselves. We see, moreover, agriculture always progressing with national liberty, and with the arts and sciences. The art of irrigation is, with the exception of the United States, now to be found among all civilized nations; and in certain parts of England and Germany it has made great progress: in the latter country it has probably made greater advances than elsewhere. The country of Seigen has acquired great celebrity for its system of irrigation. Protected and encouraged by the Duke of Nassau, it has become there really an art; and when reference is made in Germany to the method of watering meadows, it is always understood to be such as is practised on the banks of the Seig. Grading the soil—its distribution—the management of the water—in a word, all the processes, are subjected to rules that make of irrigation a real science—which we will now endeavor to explain in such of its details as are of easy application in the United States.

Water.—All the water existing in the atmosphere returns to the earth in the shape of rain, snow, hail, mist, or dew. The permeability of the earth's surface allows the infiltration of water, which descends until arrested by impervious strata of clay, rocks, &c. The fluid follows the inclinations of these strata until pressure or some other cause forces it to the surface, whence the origin of springs. These springs united form brooks, and the union of several of these, rivers, by which the waters flow into the sea. Thus this element forms an endless chain: rising from the sea in the form of vapor, it falls again to the earth, and thence returns anew to the ocean. All the water, then, applicable to irrigation, must be derived from rain, springs, brooks, rivers, or lakes.

[TO BE CONTINUED.]

From the Journal of the Roy. Ag. Soc. of England.

ON THE ACCURATE LEVELLING OF DRAINS.

BY COLONEL CHALLONER.

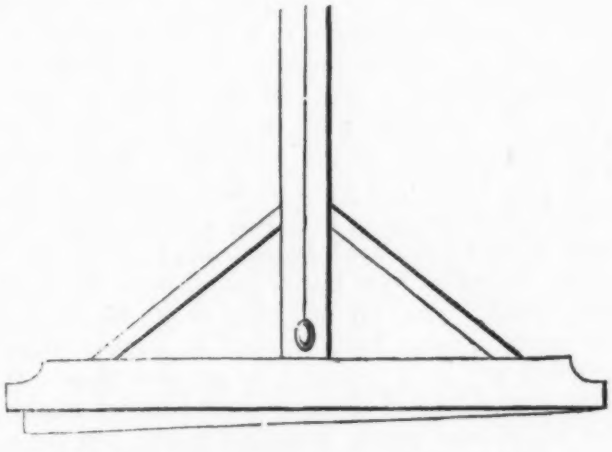
To Ph. Pusey:

DEAR PUSEY:—As complaints are very often made of failures in draining, in consequence of drains choking or stopping up, especially where small pipes are used, I am induced to address a few practical remarks to you, not with the view of suggesting any thing altogether new on the subject, but rather of calling the attention of many of our professional drainers, as well as the landowners and farmers, to a few matters of practical detail in the manner of cutting the drains and laying in the pipes, which, if attended to accurately, will greatly lessen the causes of complaint

against the (much abused) "small pipe-tiles;" for I have found by experience that the large-bore pipe-tile is equally subject to stopping up or choking, from the same cause as those of a smaller diameter.

It is generally the custom for drainers, when cutting drains, to try if they have the proper fall, by pouring a small quantity of water into the bottom of the drain, and if that runs in the direction they wish, they rest satisfied that they have cut the drain to a proper and regular fall; whereas if that cutting is proved or tested by the level, as hereafter described, it will be found to be any thing but what it ought to be, especially where the fall from the head of the drain to the outfall is but trifling; and upon accurately testing it, it will, in most instances, be found that the workman has consumed more than the due proportion of the amount of fall that he has at command in one portion of the drain, while his tiles will lie dead and flat in another; and in many instances I have found the tiles lying in hollows, and following the *undulations of the surface*, as if on purpose to collect the sand or sediment which in a short time chokes the drain. I will now very briefly state how this may be avoided with little or no additional expense or trouble, and what I have myself practised with the greatest success and satisfaction to my workmen.

I first ascertain what amount of fall I can obtain from the head of my drain to my outfall: suppose the length of the drain to be 96 yards, and I find I have a fall of 2 feet, that gives me a fall of one quarter of an inch in every yard. I then take a common bricklayer's level, 12 feet long, to the bottom of which I attach with screws a piece of wood the whole length—1 *inch wider* at one end than at the other—thereby throwing the level 1 inch out of the true horizontal line; when the drain has got to its proper depth at the outfall, I apply the broadest end of the level to the mouth, and when the plumb-bob indicates the level to be correct the 1-inch fall has been gained in the 4 yards; and so on I keep testing the drain as it is dug quite up to the head, when an unbroken, even, and continuous fall of 2 feet in the whole 96 yards has been obtained. The pipes are then laid in, and the level proved again on the pipes, which regulates any little inequalities in laying them in: this I have found that the men do willingly without any additional charge per rod; but even supposing that the men were to fancy that it was any additional trouble, a very slight increase in the pay per rod would be amply and fully compensated by avoiding, in many instances, the vexations attendant upon draining.



Bricklayer's Level on a large scale. The false bottom may be made with a hinge, so as to answer for any fall.

A—Undulating surface of Land.
B—The line shows the position of very many drains when accurately examined by means of the level.
C—The plain line shows the position of a drain put in as recommended.

SANDSTONE AS A BUILDING MATERIAL.

To the Editor of the Plough, Loom, and Anvil:

UNDER the conviction that every house should be constructed with *direct reference to its use*, and that in building houses for *public operations* rigid economy should be adhered to by the selection of the cheapest materials which *are fit* for that purpose, the object of this communication is to show the fallacy of the grounds on which sandstone has, for some time past, and recently by two reports from the Department of the Interior, been denounced as a *perishable material*, and in *all respects an unfit one* for the construction of houses in Washington City which are designed for *public operations*, in fact, and to all *practical ends, workshops.*

The objection to sandstone most relied on is, that it cannot, without *ruinous decay*, endure the action of wet and frost on it. And as evidence of this, attention is invited to a few blocks of *imperfectly petrified* sandstone which *by inattention* were placed in the walls of the Capitol. Those blocks are, after the lapse of half a century, to some extent (by no means ruinous) impaired, as would be the case with any other species of imperfectly petrified rock. As well might brick be denounced, since, *by inattention*, some of these which have been *imperfectly burnt* are often placed in a wall. They decay by exposure to wet and frost; while *well-burnt* bricks thus exposed sustain no injury. Such is the case with sandstone; for though a few *malformed* blocks of it in the walls of the Capitol are to some extent impaired, the remainder of the blocks are as sound under the *same exposure* as when taken from the quarry. Obvious as all this is, those impaired blocks are considered good cause by the Secretary of the Interior to recommend paint or a *mask* of marble to be put on the sandstone walls, in order to preserve them, of all the public offices. And this recommendation is made on the erroneous assumption that paint was put on the sandstone walls, in order to *protect them* from decay, of the Capitol and mansion of the President. Those walls were constructed in the year 1799, and paint on them was not deemed necessary to preserve them *from decay*, or to gratify such as might be horrified at the dull color of sandstone, until August, 1814, when the Capitol and mansion of the President were burnt, but without the least damage to their sandstone walls. The only bad effect of the fire on those walls was to spread on them a profuse black smoke; to remedy which those walls were painted, but not, as is assumed, to *preserve them.* If those walls had been *then* constructed of the *now* much-admired marble, or granite, the same fire would have utterly destroyed them; aud the cost of reconstructing them would have been as a mountain to a mole-hill, compared with the now much complained of cost of the paint on them.

As evidence of the early use and durability of sandstone as a material for building, the walls of the Castle of Edinburgh, one of the oldest buildings in modern Europe, were constructed of red sandstone, an inferior article to ours; and those walls are now unimpaired, though unprotected by paint, or a *mask* of marble. Again, the writer of this has resided more than eighty years in the midst of an extensive sandstone region; during which time he has known it to be used for building, and for many other purposes, and he has never seen a *perfectly formed* block of it im-

paired by exposure to fire, or to the action on it of wet or frost. He *now knows* a very large mansion house and suitable offices, the walls of which are of sandstone; and though they were constructed more than a century since, they are now as sound as when put up, and that without the protection of paint, or a *mask* of marble on them. And there are now grave-stones of it in the old church-yards in Virginia, which date back from one to two centuries, as unimpaired as when taken from the quarry; and the inscriptions on them as perfect as *when executed*. Not so on marble! But what ought to be sufficient of itself to silence all objections to sandstone, especially to its fitness for the construction of the *public offices*, is the fact, that General Washington, who had been many years *practically* acquainted with it, recommended it as the *most fit* material for the walls of the Capitol and mansion of the President; and in order to insure a supply of it in the most certain and *cheap* mode, he advised the purchase, on public account, of a sandstone island in Aquia Creek, distant from Washington City fifty miles down the river Potomac. The purchase so advised was made, and though that island is now the property of the Government, the devotees to marble, regardless of cost, make no use of it. This advice of Washington erected a monument to his sound judgment; since those houses, though they were burnt in 1814, left their sandstone walls perfectly unimpaired, and so they remain *now* after the lapse of half a century, with the exception of a few *imperfectly formed* blocks already referred to above. Without regard to all this, two distinguished gentlemen, members of the Committee of Congress on Public Buildings, backed by some devotees to magnificence, cost what it might, and by others desirous to open *a good market for marble*, all made a rally when the present Treasury Office was to be constructed, and they all advocated marble as the most fit material for that building. But better counsels prevailed, and sandstone was adopted. When, however, the walls of that building were complete and ready for the roof, those gentlemen and their associates again rallied and made a proposition to have them *taken down*, to be reconstructed with *marble*. To effect this, they invited two stone-masons, one in New-York, the other in Philadelphia, to come to Washington, in order to examine those walls, and to give their opinion as to the fitness of sandstone for their structure. Those individuals came and made the desired examination, and they united in a written opinion that sandstone exposed to wet and frost could not last more than seven years, and that its texture was so friable as to render it certain that the ponderous arches constructed of it would crush down as soon as the frames of wood over which they had been put up should be taken from under them. Again better counsels prevailed; as evidence of it, the walls *then proposed to be taken down* are now as sound as when they were put up, and that without the protection of paint, or a *marble mask*. And as respects the frailty of the arches, the individual who had constructed them, regardless of the aforesaid opinion of his brother masons, *at once* took the frames from under them, and that, too, before the masonry work *was entirely dry*. The result was, that all those arches stood firm, so that to *this day* there is not a *visible crack in any one of them*. A signal proof this is of the masterly skill with which those arches were constructed, as also of the capacity of sandstone to sustain pressure; which, by the way, has been tested at the Navy Yard here, and a block of sandstone sustained more pressure than a block of granite of equal size. And as to the comparative capacity of sandstone

and marble to sustain, without injury, exposure to wet and frost, the naval monument at the western base of the Capitol exhibits a striking proof in favor of sandstone. That monument stands in a reservoir of water ordinarily about four feet deep. The base on which it is placed is of sandstone, and of course *immersed* in water to the extent of four feet, and during winter often for many days embraced by *thick ice:* yet not the least injury has been done to the sandstone, or to the base formed of it; while the marble superstructure, though high above the water, and exposed *only to rain and frost*, is in great disorder, and without repair must perish. When the present Post Office was to be built of sandstone, the advocates of marble, under the pretext of hiding the dull color of the walls, and the yellow spots on them occasioned by the solution of the sulphate of iron, were successful in having a *marble mask* placed over them, which has turned out to be a remedy as bad, if not worse, than the disease complained of; since a solution of the sulphate of iron, which marble also contains, is profusely spread over the *marble mask*, so as to render it as yellow as the face of a newly painted Indian. And to cap the climax of the now prevailing devotion to marble, the Patent Office, built of sandstone, is to be enlarged by two magnificent wings of marble, which is in about as good taste as to place fine cambric ruffles on a coarse brown shirt.

Such being the facts in regard to sandstone, why should it be discarded as *an unfit* material for the construction of the *public offices?* All such houses, and the furniture in them, should exhibit without mistake the *purpose* for which they *were designed;* and it is to be regretted that such houses are now constructed and *furnished* with a *magnificence* which does not comport with that economy which those who *profess* to be republicans ought to observe and *practise.* Such is the humble opinion of an invariable republican from the year 1776 to this date.

RHUBARB.

Mr. Joseph Myatt, of Deptford, a kind and most benevolent man, now upwards of seventy years of age, was the first to cultivate rhubarb on a large scale. It is now nearly forty years since he sent his two sons to the borough market with five bunches, of which they could only sell three, so little was the value of this excellent vegetable then known. The other two bunches they brought home with them. The next time they went to market they took ten bunches with them, all of which were sold. "Coming events cast their shadow before them," and from the small but increased sale, Mr. Myatt judged, and rightly, that rhubarb would become a favorite. He therefore determined to increase its cultivation, and year after year added to his stock; the demand for it was augmented in an equal ratio. For his first dozen roots he was indebted to his friend Mr. Oldacre, who was then gardener to Sir Joseph Banks. They consisted of a kind imported from Russia, finer and much earlier than the puny variety cultivated by the Brentford growers for Covent Garden.

It is reported of Mr. Rivers, that when he first began to speculate largely in rose growing, his old foreman, long since gone to his last resting-place, came one day, with a very grave face, and said, "Master Tom, you are *surely* out of your mind; what *are* you going to do with all those brambles? It is a shame to plant them on land that would grow standard apples!" So it was with Mr. Myatt and his extensive rhubarb planting. When one of his sons said in market one day that his father intended to plant an acre next year, they said, "Your father, poor man, is fast taking leave of his senses." Like Mr. Rivers and others of a "go-a-head" turn of mind, Mr. Myatt had to contend against many prejudices; but time, that "universal

leveller," overcame and broke down every barrier, and rhubarb is now no longer called physic as it was then. In our own day, it forms most delicious and wholesome tarts and puddings, as well as an excellent preserve; and as we have sugar and flour so cheap, any system of growing this useful "vegetable fruit stalk," as it may be called, earlier and more plentiful during the winter than it is at present, must prove a benefit.

By the plan I am now about to propound, I think rhubarb might be had fit for table at least five weeks before the London growers could obtain it out of doors. But in the first place, let me premise that there is a wonderful difference in the sorts as to earliness and quality. Myatt's Linnæus and Mitchell's Royal Albert are the earliest and the best flavored, and wherever any of the other rougher sorts exist, they ought to be done away with at once; for there is as much difference between the flavors of rhubarb as between a ripston pippin and a codlin apple. Besides, we want every thing early, and as rhubarb is so easy of carriage, what reason can there be why Cornwall and Devon* should not furnish it in large quantities, as they now do the London markets with their far-famed white winter broccoli? In these days rhubarb would find a ready market in every town in the kingdom, and there would be no fear of producing too much, provided it could be sold cheap enough. As manure is a principal item in its culture, the supply of this must be duly considered, before the locality is fixed on where it is to be grown, which should be fields contiguous to some line of railway or steamboat. Being one of the grossest feeders of any vegetable we have, rhubarb should have plenty of manure; and just in proportion as the latter is well or ill supplied, will the crop be abundant or scanty. The very strongest manures, as cow dung, night soil, horse dung, or sewerage water, suit it perfectly. In the latter might be soaked Irish peat charcoal, which *has the power of absorbing a large quantity of water readily, and every thing grows well in it.*

My plan is to form large plantations of rhubarb along the sides of some railway in Cornwall or Devon, and, as in the case of sea-kale and asparagus, if practicable, ground should be chosen for it that slopes to the south, for this will make a difference of *at least ten days in its earliness.* When the land has been selected, dung it heavily, and trench it at least two spits deep. This should be done before the heavy rains of winter set in. Soil of too stiff or too clayey a nature must be avoided, for that would make a difference in the earliness. For the same reason, wet land should not be selected, for that is *at all times* 5° *colder than well-drained land:* besides, the latter offers facilities for air reaching the roots which wet land does not, and without air, the roots cannot thrive any more than the tops can.

Before making the permanent plantation, it would be well if a large number of the best sorts were previously planted out thickly in a piece of ground, and coming forward; these might be divided and increased with advantage, leaving a bud on each division. This will multiply your stock amazingly, and lessen your outlay for plants. Mr. Myatt plants four feet square, but that is quite a foot too wide for field culture, if no other intermediate crop is intended. The plants ought to be put in alternately, or quincunx fashion, which gives them more air, and the roots fair play. In the first year, something dwarf might be sown between the rows, as turnips for instance. Next year the rhubarb plants will afford a fair picking, and in doing this some leave nothing but the flower stems to draw up the sap, until the last pulling takes place, and then the flower stems are removed; but Mr. Myatt makes it a rule never to pull every stalk off, for that injures the root. It is quite certain that leaves and flower stems are in a great measure formed out of the matter that was stored up in the roots the previous year; and if we cut them off without allowing them to restore to the root that which they have taken from it, we shall have a weaker growth the following year. It is on this principle that the leaves of crocuses and snow drops are never removed by good gardeners, till they have fulfilled their office, and become withered; for if they were, the result would in all probability be no flower next year. Rhubarb roots should therefore never be perfectly denuded of foliage.

At the present time (April 25th) there are many tons being sent northwards daily. All growers might easily have forced rhubarb all the winter, by making trenches five feet broad, and one or two hundred yards long, taking up the roots and packing them in the trench, and putting mould upon them. Hurdles covered

* The region of warm light soil, on the southern slopes of the hills on the north side of Magothy river, in Maryland, would make the best early market garden in the Union, if it had railroad or steamboat facilities.—*Ed. P., L., and A.*

with straw might be placed over all. Nothing more would be needed; but of course it would require immense quantities of roots to replace those that were forced, which should not be thrown away, but cut into eyes and planted again. In order, however, to save the roots where they stand, and still get them earlier, they must be covered with pots, which must be made for the purpose, not less than eighteen inches high and a foot in diameter. They should have no hole at the top, as that would not only let out the heated air generated in the inside by the sun's rays, but would cause the interior to be colder than the external atmosphere. To avoid the expense of pots, covering the crowns with plenty of straw is a good plan to protect it; the straw would afterwards act as a manure to the ground. Many persons prefer rhubarb grown in a half blanched form, they think it more delicate in flavor; one thing is certain, that it does not form so large leaves, and would be easier packed. The mild climate of Cornwall and Devon would however, without any artificial treatment, produce rhubarb fit for use at least five or six weeks before it could be brought to market from any where else; and instead of having five or six weeks' cheap rhubarb, as we now have, we should then have a two or three months' excellent supply. It is now (March 10) selling at 1s. a bunch of from twelve to eighteen heads, which, trifling as it may appear, is such a price that the middle and industrial classes cannot pay.

Ireland, which has the finest land and climate in the world, and which has railways passing from its south to its north, possesses extraordinary capabilities for producing every thing in first rate style. The south could supply the north with early produce; the north again could supply the south with late produce and in this way a long continuance of good and cheap things would be the result. But when shall these things be? When shall that unhappy portion of the British dominions care for its own and its neighbor's interest? Let us hope that it soon will, that the dark cloud which at present hangs over it will pass rapidly away and ere long fair "Erin" will put on a bright and a more industrious and smiling face.*—*Cuthill.*

For the Plough, the Loom, and the Anvil.

RAGS FOR MANURE.

Several years since, while perusing an agricultural publication, I chanced upon an article recommending rags as a manure. The writer, it appeared, had instituted several experiments, all of which had been attended with complete success, and as he had been to the trouble of detailing the *modus operandi* at considerable length, I concluded to test the truth of his observations by an immediate trial.

The soil made choice of for this, to me, somewhat novel experiment, was a light, gravelly loam, the natural productiveness of which had been so greatly diminished by the process of long continued and injudicious cropping, that I had long been on the eve of abandoning it in despair, as the produce was, generally speaking, insufficient to renumerate me for the expense of cultivation. The spring at the time was too far advanced to admit of an experiment with corn, and the patch was ploughed for potatoes; and the entire piece, containing about one tenth of an acre, after being thoroughly harrowed, was struck off into squares by longitudinal and transverse furrows, in order to facilitate the operation of hilling, which I find is much more speedily and economically performed with the single horse-plough, with two furrow-boards, than by the ordinary process of hilling with the hoe. The hills being thus prepared for the reception of the seed, the process of "manuring" was commenced by dropping a heaping-shovel full of stable manure in one hill and as many rags, chopped fine,

* Not while "subject to the policy of the British merchants." The escape of Laocoön from the embraces of the serpent would have been quite as easy.—*Ed. P., L., and A.*

as could be grasped by one hand, in the next, and so on, alternately, till the whole was completed, and the hills ready for the reception of the seed. After dropping this, which was of the hog-horn kind, and bestowed at the rate of four eyes or "*sprouts*" to the hill, on two "cuttings," the labor of covering was performed by a careful hand, and in the ordinary method, with a common hoe. The after culture was extremely simple, and consisted merely in cutting down the weeds, the surface of the ground being kept nearly level, in order to facilitate the descent of water to the roots, till the final hoeing, which was performed almost wholly with the plough. There was one circumstance, however, connected with the growth of this crop, that to me appeared somewhat singular.

From the period at which the youthful plants were first developed, till the day on which they were entirely prostrated, and their vegetative powers arrested by the "*rust*," not the slightest difference was perceptible through the piece; those which had been manured with rags springing as rapidly from the soil, and, to all appearance, with as much vigor and luxuriance of growth, as the rest, while the rags were apparently as firm, and their colors nearly or quite as brilliant as when first inhumed!

The yield was not large; a circumstance which I attributed to the early visitation of the rust, which intercepted their growth in mid-career, and which gave to the entire piece, as well as to most other pieces in the vicinity, the appearance of having been prostrated by a killing frost.

A considerable portion of the tubers, however, were of a medium size, very smooth and handsome, and equal, *in every respect*, to those on which I had bestowed a far more elaborate cultivation, and a richer soil. Had the season been *dry* instead of *wet*, the result would doubtless have been still more favorable. That rags constitute a valuable article for manuring land, there can, I think, be no longer any question. The experiments that have been already made demonstrate conclusively, that, when easily obtainable, their assistance is valuable; their peculiar properties of absorbtion and retention rendering them highly efficient on light soils, particularly where there is an excess or superabundance of sand.

In the vicinity of cities, large quantities of woollen rags can be obtained with ease, and at small expense. So also, in the neighborhood of carpet and other woollen manufactories where large masses of rubbish accumulate in the yards and streets without being appropriated to any use.

In conclusion permit me to present the following extracts relative to the character of wool, from the pen of CHAPTAL:—

"A very good manure is formed from wool. According to the ingenious experiments of Mr. Hatchett, hair, feathers and wool are only particular combinations of gelatine, with a substance analogous to albumen; water can only dissolve them by means of fermentation, which takes place slowly, and after a long time. One of the most surprising instances of fertility that I have ever seen, is in a field in the neighborhood of Montpellier, belong to a manufacturer of woollen blankets. The owner of this land causes it to be dressed every year with the sweepings of his workshops; and the harvests of corn and fodder which it produces are astonishing.

"It is well known that from the hairs of wool transpires a fluid which hardens upon their surface, but which possesses the property of being easily soluble in water. This substance has received the name of animal sweat; the water in which the wool has been washed contains so much of it as to render it very valuable as manure. I saw, thirty years since,

a wool-merchant in Montpellier, who had placed his wash-house for wool in the midst of his fields, a greater part of which he had transformed into his garden. In watering his vegetables he had used no other water than that of these washings; and the beauty of his productions was so great as to render his garden a place of public resort. The Genoese collect, with care, in the South of France, all they can find of threads and rags of woollen fabrics, to place at the foot of the olive trees. According to the analysis of M. Vauguelin, this animal sweat is a soapy substance, consisting of a base of potash, with an excess of oily matter, and containing, besides some acetate of potash, a little of the carbonate and of the muriate of the same base, and a scented animal matter." The scientific agriculturist will readily perceive *why* an article, composed of such ingredients, should act favorably on the soil and crop.

ON THE CULTIVATION OF TOBACCO.

(*Continued from the February Number, page* 494.)

We now proceed with the "*Notes on the Cultivation of Tobacco*" by that excellent planter and yet better man, the late Peter Miner of Albemarle, Virginia.

OF THE PREPARATION OF THE LAND, AND CULTIVATION OF THE CROP.

The best tobacco is made upon new or fresh land. It is rare to make more than three successive crops upon the same ground, of which the second is the best, the first and third being about equal. But it is more common to make only two. The new land, after all the timber and brush is removed, and the surface very cleanly raked, is twice closely coultered as deep as two horses or oxen can pull. After this, hands with grubbing hoes pass regularly over the whole ground, and take up all the loose roots that have been broken by the coulter, which are heaped and burnt, or removed. One, and sometimes two more coulterings are then given, and the same operation repeated with the grubbing hoes, which leaves the land in proper order to be hilled: this is universally done in straight rows at the distance of three and a half feet apart, giving the same distance, as near as the eye will permit, the other way; in *fresh* land, that is to say, for the second and third crop, the line of the original row, and even the locality of each hill should be preserved. After passing the coulter two or three times between each row, the hills should be made in the same place, the remains of the stalk and roots of the plant being first removed. It is supposed, from the excess of nitrous particles contained in tobacco, above any other plant, that the partial decomposition of this stubble during the winter imparts a degree of f rtility to the spot which should not be lost by the diffusion and exposure of a general ploughing. It is most advisable, too, that the hilling of new and fresh land should be done as early in the spring as possible, say three or four weeks before planting. This affords time for the hill to settle to a proper consistence, and presents a more extended surface to be acted on by atmospheric influence, which-perhaps is greater in the spring months than at any other season of the year.

On the bottom land of our rivers there are extensive alluvial flats that bear successive crops of tobacco for many years, and some planters resort to highly manured spots conveniently situated upon high land. But in general, it is considered bad economy to manure land for tobacco, both because the quantity required for that crop is greater than for any other, and because the quality of the product, as well as that made on low grounds, is coarser in fibre and less marketable. The preparation of such land, however, is the same as that of new ground, except that the large plough and harrow are substituted for the coulter and grubbing hoe, and the hilling may be a little longer delayed.

If the seasons have been favorable, and the plant beds duly attended to, as before observed, the plants will be ready to be set out from the 15th to the last of

May. It is most common to wait for rain, or *season* as we call it, to perform this operation, in which case the hills must be previously cut off about four inches above their base; but in early planting it is quite safe to proceed without a season, provided it is done in the evening, and the hills cut off at the same time. It is universally admitted that a moderate season is better than a very wet one; and that is considered the best, in which the earth does not entirely lose its friability, but at the same time will bear to be compressed closely about the roots of the plant without danger of becoming hard or baked. Under the most favorable circumstances, however, some plants will fail or perish, and therefore the ground must be gone over after every rain until the last of June to replant the missing hills. It is not important here to describe the mere cultivation of the crop as it respects tillage, it being only necessary, as in the case of all other plants, to keep the earth light and free from weeds and grass. This is generally done by two weedings, first by scraping a little earth and all the young grass from the plants, and then in a short time restoring the same earth, and as much more as will make a considerable hill around each. In old land, and that free from stumps, the single-horse shovel-plough is used with great advantage as an auxiliary to the hoe.

When the plants attain a proper size, which observation and experience will readily point out, they are to be primed and topped. The priming is merely stripping off four or five leaves at the bottom, leaving about a hand's breadth between the first leaf and the top of the hill. Topping is simply taking out the bud with the finger and thumb nails, leaving the necessary number of leaves, which in general is not more than eight, though the first topping may be to nine or ten leaves to make it ripen more uniformly, and bring the crop into the house more together. For the same reason, the late plants are not topped to so many, falling from eight by degrees as the season expires, down to six and five. A little practice, and slight attention to the manner in which the leaves grow from the stalk, will soon enable a person to perform this operation with great dexterity and dispatch, without counting the leaves. All that is requisite after this until the plant is fit to cut, is to keep it from being eaten by the worms, and to pull off the suckers that grow out at the junction of the leaves to the stalk. These suckers put forth only twice at the leaves, but after that indefinitely and continually from the root; and it is thought injudicious ever to let them get more than a week old, for besides absorbing the nutriment necessary to push forward, and increase the size and thickness of the leaf, the breaking them off when of a large size makes so great a wound as greatly to injure the after growth of the plant. In general, about three months is requisite to perfect the growth of tobacco, from planting to cutting.

OF THE DISEASES AND CASUALTIES TO WHICH IT IS SUBJECT, AND ITS TENDENCY TO EXHAUST LAND.

Tobacco is subject to some diseases, and liable to be injured by more casualties and accidents than any other crop. That growing upon new or fresh high land is seldom injured by any other disease than the *Spot* or *Firing*, which is the effect of very moist succeeded by very hot weather. For this we know of no remedy or antidote. Tobacco growing upon old land, particularly upon low flats, besides being more subject to Spot, is liable to a disease we call the *Hollow Stalk*, which is an entire decay and rottenness of the inside or pith, terminating gradually in the decay, and final dropping off of the leaves. This disease is sometimes produced by the wounds caused by pulling off overgrown suckers, thereby admitting too great an absorption of water into the stalk through the wound. In land not completely drained, the plants are sometimes apt to take a diminutive growth, sending forth numerous long, narrow leaves, very thickly set on the stalk. This is called *Walloon* tobacco, and is good for nothing. As there is no cure for these diseases when they exist, we can only attend to their prevention. This will at once be pointed out by a knowledge of the cause, which is too much wet, and indicates the necessity of complete and thorough draining before the crop is planted. It may not be amiss here to mention, that tobacco is more injured than any other crop by ploughing or hoeing the ground when it is too wet, and to express a general caution on that head.

The accidents by which tobacco is often injured and destroyed, are high winds, heavy beating rains, hail storms, and two kinds of worm, the ground or cut worm, and the large green horn worm. High winds, besides breaking off the leaves and thereby occasioning a great loss, are apt to turn them over. The plant, unlike most others, possesses no power to restore the leaves to their proper position, which must shortly and carefully be done by hand, otherwise the part inverted will gradually

perish and moulder away. Those who have studied the anatomy of plants can tell us the cause of this, as well as why nature has denied to tobacco the faculty of restoring its leaves to their proper position. The ground worm, the same which is sometimes so fatal to corn, is ascertained to be the larvæ of the common black bug found in great numbers under wheat shocks, &c. This worm is seldom or never found in new land, but abounds in old or manured ground; and in some years I have seen them so numerous, as to have from forty to fifty taken out of one hill in a morning. The alternatives are either to abandon the crop, or to go over the ground every morning, when they can be found at or near the surface, and destroy them. The missing hills to be regularly replanted. The horn worm is produced from a large, clumsy, gray colored fly, commonly seen late in the evening sucking the flowers of the *Stramonium* or *Thorn-apple*, commonly called here the *Jamestown Weed*. The flies deposit their eggs in the night on the tobacco, and all other narcotic plants indiscriminately, as Irish potatoes, tomatoes, &c. In twenty-four or thirty-six hours the eggs hatch a small worm, which immediately begins to feed on the leaf, and grows rapidly. Great care should be taken to destroy them while young. Turkeys and Guinea fowls are great auxiliaries in this business, but the evil might be greatly lessened if the *flies* were destroyed, which can easily be done in the night by a person walking over the ground with a torch and a light paddle. They will approach the light and can easily be killed. In this way I have known a hundred killed in one field in the course of an hour.

Tobacco has been reproached as the cause of the general exhausted condition of our lands, of the slow-paced improvement in the Virginia system of agriculture; in short, as the bane of all good husbandry. This stigma is, I am persuaded, in a great measure unmerited. It is true, that like Indian corn, from the frequent and high degree of tillage it requires throughout the summer, it exposes the ground to be washed by hard rains, and evaporated by the hot sun; but the plant in itself is less an exhauster than corn or wheat. A proof of this is to be found in the superior growth and perfection to which any crop will arrive when grown after tobacco, than after any thing else, not excepting clover that has been ploughed in. Perhaps this may be accounted for from the facts, 1st. That the roots and stubble of tobacco left on the ground are more in quantity, and contain more of the essential qualities of manure, than those of any other plant; 2d. The plant itself while growing feeds more from the atmosphere than any other; and 3dly. It is not suffered to go to seed, the process in all vegetation which is supposed to make the greatest draft on the fertility of the earth. Neither is the culture of tobacco incompatible with a proper rotation of crops, and an improved system of husbandry, for we find as extensive and as successful efforts at improvement made in the tobacco region, and by tobacco makers, as in any other section of our State.

NEW BOOKS.

A Treatise on the History and Management of Ornamental and Domestic Poultry. By Rev. Edmund Saul Dixon, A.M. Illustrated with many original portraits, &c. 1 vol., pp. 480, 12mo.

This appears to be really a good book. The author has gone deep into the mystery of Fowl-raising, and the fact of its having gone through two editions in England speaks well for it. Published by E. H. Butler, Philadelphia.

Knowlson's Cow and Cattle Doctor, is the title of a little book of 64 pages, sent to us by T. B. Peterson. Price 25 cents.

The Fruit, Flower, and Kitchen Garden. By Patrick Neill. Adapted to the United States. From the fourth edition, pp. 427. Philadelphia: Henry Carey Baird. 1851.

This admirable little book, which has been introduced to the American public in so neat a form, is just what is needed. Small but comprehensive, the matter is treated on by one who evidently understands his subject. That part which treats on the culture of the V ne appears to be particularly valuable. Indeed the book should be in the hands of all who either for pleasure or profit are interested in so beautiful a subject as the cultivation of flowers, or the more useful one of fruits and vegetables.

AGRICULTURAL ADVERTISER.

OPPORTUNITIES such as the one here offered so rarely occur, that all who desire a dip of the best blood of "Short-horns" to be had in any country, will do well to be in attendance personally, or by agent.—ED. P., L., AND A.

GREAT SALE

OF SUPERIOR

THOROUGH-BRED SHORT-HORN CATTLE.

THE SUBSCRIBER,

HAVING MORE STOCK THAN HE CAN WELL SUSTAIN ON HIS FARM,

WILL OFFER AT

PUBLIC AUCTION

About Thirty Head of his Improved Short-horn Cattle,

CONSISTING OF

BULLS, COWS, HEIFERS,

AND HEIFER AND BULL CALVES,

ON THE

26TH DAY OF JUNE NEXT,

At his Farm, two and a half miles from this City,

(TROY, N. Y.)

It is known to breeders of improved stock in this country and in Canada, that the proprietor of this herd during the past twelve years has, through the medium of importations from England, and selections from the best herds in this country, spared no expense to rear a herd of cattle from which superior animals could be safely drawn for improvement and crosses upon other herds. His importations have been derived from that eminent breeder, the late Thomas Bates, Esq., of Kirklevington, Yorkshire, England; which herd, it is well known, has recently been disposed of at public sale by his administrators, and dispersed in many hands, and can no longer be resorted to as a whole for improvement.

The announcement of that sale created great interest, and all Short-horn breeders in England seemed emulous to secure one or more of these animals to mingle with the blood of their own herds; and at the day of sale, there was found assembled the largest audience ever before witnessed upon a similar occasion, numbering, as was said, four to five thousand persons, and among them the best breeders in England, and several from other countries, some of the animals bringing prices that seemed incredible to many.

In the herd now offered for sale will be included the imported Bull, Duke of Wellington, and the premium Bull, Meteor; these are Bates's Bulls, and their reputation as stock getters is too well known to need any comment. I am, however, authorized by Lewis F. Allen, Esq., of Black Rock, one of the most prominent breeders in this country, and who has had ample means of forming a judgment, to say, "that in no instance, to his knowledge, had these two Bulls been placed to short-horn cows of other herds previously imported into the United States, but what the produce was superior, in general qualities, to such herds."

The most of the stock which is now offered for sale have been bred from these two Bulls, and the proprietor having a young Bull, more remotely connected with that portion of the herd he retains, (being about fourteen in number,) can spare these two valuable Bulls. There will be in the stock offered for sale six young Bulls from about eight months to two years old in addition to the two named above, and the remainder of the stock will be composed of Cows, (most of them possessed of extraordinary milking qualities,) Heifers and Heifer Calves. It is believed that no herd of Short-horns has ever been offered for sale in this country exhibiting more of the valuable combinations of qualities which contribute to make up perfect animals.

A Catalogue containing the pedigrees of these animals will be ready for delivery at an early period, in which the terms of the sale will be particularly stated. A credit will be given from six to eighteen months.

Gentlemen are invited to call and examine the herd at their convenience.

GEORGE VAIL.

Troy, N. Y., February 15th, 1851.

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☞ Will our patrons be good enough to let their friends know, that if they wish to subscribe to "The Plough, the Loom, and the Anvil," they can commence at *any time*, and that a five dollar note will pay for *two* for one year, or ten dollars will pay for five.

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Do. do. Alderney do. do.
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Poultry of the various breeds,
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DOMESTIC ANIMALS AT AUCTION.

THE POSTPONED YEARLY SALE OF

FULL-BRED SHORT-HORNS,

AND

IMPROVED DAIRY STOCK,

Consisting of about FIFTY HEAD, will come off at my FARM,

ON

TUESDAY, JUNE 24th, 1851,

AT 12 O'CLOCK, M.

I shall dispose of all the improved Dairy Stock, which is composed of the finest Short-horn, with a slight cross of Amsterdam Dutch, which some writers say was part of the original ingredient which composed the improved Short-horns.

I am now breeding the Short-horns, Devons and Ayrshires, each separately and pure, which, owing to the limits of my farm, make it necessary to confine myself to those three breeds. By the awards of the State Agricultural Society, the American Institute, and my own County Society, (with the exception of last year, when I was not a competitor at either,) it will fully appear that I have been a very successful exhibitor. The cow which won the FIRST PRIZE as a milker, at the American Institute last year, was bred by me, and composed of the above alluded to Dairy Stock. Several of the Bulls got by Lamartine will be of the most appropriate age for efficient service the coming season. All Cows and Heifers old enough, will be warranted in calf at the day of sale, by my Imported Bull "Lord Eryholme," or my celebrated Bull "Lamartine."

I own two thorough bred Devon Bulls; one the celebrated old Major, the other, one and a half years old, imported by me from Devonshire. One of the above animals will be sold—which, I have not as yet determined.

A full Catalogue, with the pedigree of each animal, will be published in due time, with minute description of sale, &c.

I also have a number of Suffolk Sows, in pig to my imported Boar, most of the progeny of which will be old enough to dispose of on that day.

I also have about 20 South Down Ewes, most of which I imported from the flock of Jonas Webb, and now in lamb to my imported Buck "Babraham." Some of their Buck Lambs will be offered at auction on that day.

This sale will not only offer an opportunity to obtain Stock from my previous Herd, but will also enable persons to procure calves from my imported Bull, lambs from my imported Ram, and pigs from my imported Boar—all of which animals were recently selected by me in person, when in England.

The mode of warranting the Cows and Heifers in calf, is this: in case they prove not to be so, it shall be optional with the purchaser, on his *certificate of that fact*, either to receive from me $25, (say twenty-five dollars,) or to send the cow to my farm, and I will keep her the proper time (free of expense) to have her got in calf to either of my Bulls, which he shall choose. I will give $25 for any heifer calf from either of the Cows or Heifers sold at the sale, delivered on my farm, at two weeks old.

Stock purchased to be sent a distance, will be delivered on shipboard or railroad in the city of New-York, free of risk or expense to the purchaser.

Persons living at the South, in a climate to which it would not be well that stock should be transported, at that hot season of the year, may let such animals as they may purchase remain with me until the proper season, and I will have them well taken care of, and charge only a reasonable price for their keep. One of my objects in breeding improved domestic animals, is to assist in distributing them throughout the Union, deeming it one, if not the most important feature to promote profit to the cultivator of the soil, and to benefit the consuming country at large.

All communications through the Post please pre-pay, and I will pre-pay their answers, and also a Catalogue if required. Catalogues will be to be had at all the principal Agricultural Warehouses and offices of the principal Agricultural Journals, on and after the 1st day of June next. Persons wishing to view the stock at any time will find my superintendent, Mr. Wilkinson, to give them the desired information when I am not at home.

Dated this 4th day of March, 1851, at Mount Fordham, Westchester County, eight miles from the City of New-York, by Harlem Railroad. L. G. MORRIS.

P. S. I decline selling any Stock by Private Sale, so as to offer the Public all the Animals I have to part with without having any previously selected from the Herd, and all Animals offered will be positively sold. April 1.—3t.

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WHEAT, RYE, BARLEY, INDIAN CORN, RICE, OATS, BEANS, PEAS, RUTA-BAGAS AND TURNIPS.

This machine can be regulated to drop any quantity per acre, at whatever depth required, and operates equally well on all kinds of land. It is so constructed as not to be injured by coming in contact with rocks, roots, &c. For simplicity, durability, and economy, it is unsurpassed by any other agricultural implement in use.

Price $100. A liberal discount allowed to Agents.

READ THE FOLLOWING.

Previous to harvest, we had five acres carefully measured with the chain and compass by W. Pennington, the surveyor of the neighborhood, assisted by John Jones, who saw it all cut, threshed and measured separately, with the following results:

Nos. 1 and 2.—Two acres of broadcast surveyed together—two bushels of seed to the acre—seventy-five shocks—fifty-five bushels of wheat, or twenty-seven and a half bushels to the acre.

No. 3.—One acre drilled, adjoining the above, the land, if any different, rather inferior; treated exactly alike—one bushel and one peck of seed to the acre—forty-two shocks, thirty-five bushels.

No. 4.—One acre drilled a little distance from No. 3, one bushel and one peck of seed, forty-two shocks, thirty-five bushels to the acre.

No. 5.—One acre drilled a little distance from No. 4, one bushel and one peck of seed, fifty shocks, forty bushels to the acre.

Here we see that by the use of the drill alone, (the soil being in the same, or perhaps an inferior condition,) the crop was increased seven and a half bushels per acre, and adding the amount saved, (three pecks,) make eight bushels and one peck to the acre; and further, that the amount of straw to the drilled acre, with a smaller quantity of seed sown, increased twelve per cent., and the amount of grain on the same acre was increased more than twenty-seven per cent. * * * The drill used was invented by M. PENNOCK & SONS, of Kennet Square, Chester County, Pennsylvania.

Respectfully, CHARLES NOBLE.

Philadelphia, 10th Mo., 1844.

Unionville, Chester Co., Pa., Feb. 8th, 1848.

I do hereby certify that I have used one of Pennock's Patent Drills for five years, and have put in from fifty to seventy acres of wheat for myself every year since, and have never failed having a good crop. I think I can safely say that I have realized from 30 to 50 per cent., or that it has averaged me from $300 to $400, and even $500 a year over the usual broadcast seeding. My land being low, I have lost greatly by the winter throwing the roots entirely out, which is wholly obviated by drilling. I would not take $500 for my Drill if I could not get another of the kind. JOHN HUEY.

Reedville, Mifflin Co., Pa., July 21st, 1848.

I hereby certify that, previous to harvesting, I measured one acre of wheat carefully, as follows: half an acre which had been drilled in with one of your machines, one and a quarter bushels of seed per acre—also half an acre broadcast, from one and three quarters to two bushels of seed per acre; and when cut and threshed, measured as follows: the half acre drilled wheat, thirteen shocks, measured twelve bushels and two quarts; the half acre broadcast, eight shocks, measured seven bushels eighteen quarts. The quality of the land exactly alike, and treated alike previous to sowing the seed.

ABNER THOMPSON.

We, the undersigned, were present, saw the land measured, cut the grain, and assisted in threshing the same, and believe the above statement to be correct.

JAS. REED, ALEXANDER REED,
H. G. MORRISON, WILLIAM STEELY,
D. C. MILLER, GEORGE ASHBY.

Shirly, Va., Nov. 5th, 1849.

MESSRS. S. & M. PENNOCK: * * * * I have used your Patent Seed Drill, and do consider it the most simple and perfect, as well as the most complete labor-saving machine I ever saw. It does the work in our lower James River county, of 14 harrows, 12 horses, and 5 good men—(one of them a good seedsman)—with only 3 harrows and 2 smart boys. I am determined to have two of your Drills by next season if possible. * * * *

Most respectfully, yours, &c., HILL CARTER.

The subscribers manufacture, and keep constantly on hand, the above machine, together with a general assortment of agricultural implements, such as Ploughs, Horse Powers, and Threshers, Hussey's Reapers, Horse Rakes, Corn Shellers, Fanning Mills, &c. Also, Pennock's Improved Lever Jack, for raising carriages and wagons; together with steam engines and mill work of every description.

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